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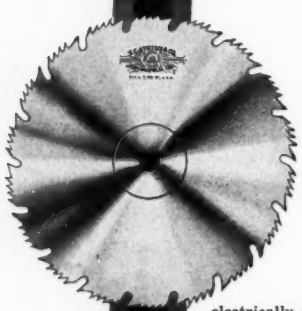

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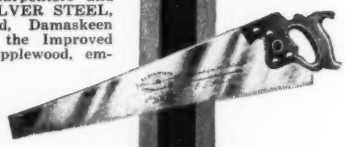

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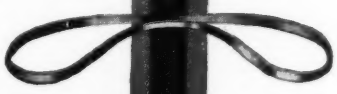

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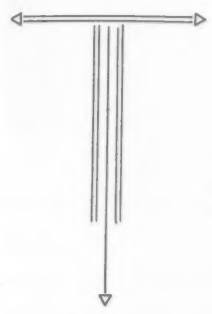
FOR YOUR BULLETIN BOARD

Pages 363 and 364 in this issue of the INDUSTRIAL-ARTS MAGAZINE contain two posters for the school-shop bulletin board.

Poster No. 1 may be displayed two weeks; then the sheet may be turned and Poster No. 2 displayed for the rest of the month.

These posters are not to be confined to safety alone, but other good bulletin-board matter will be used.

Contributions of suitable material are invited, as are also comments on the value of this service to the shop teacher.



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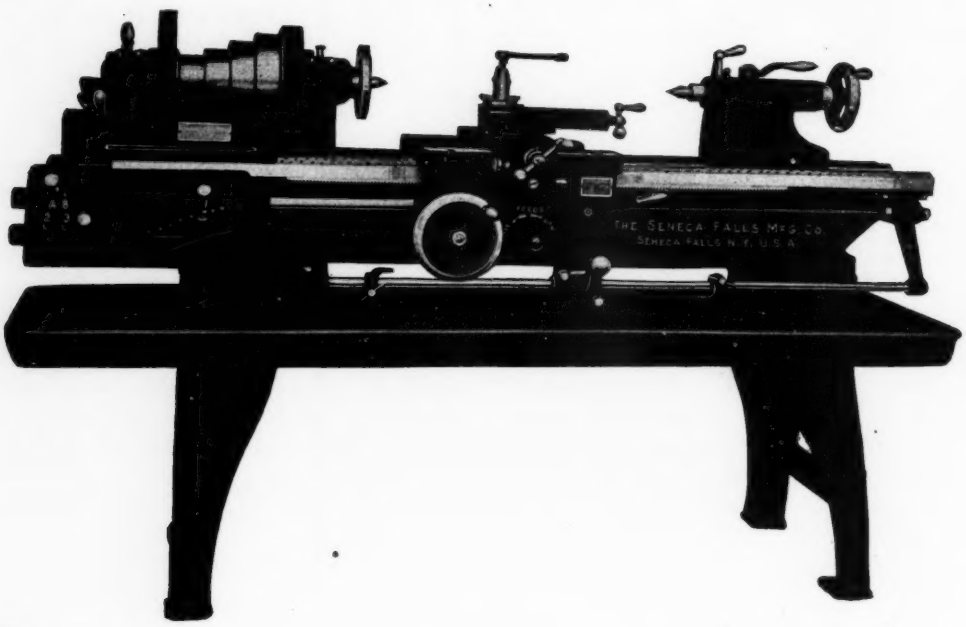

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THE INDUSTRIAL-ARTS MAGAZINE

Volume XVIII SEPTEMBER, 1929 No. 9

Guidance Values of Vocational Information and Explanatory Activities

Robert H. Rodgers, Division of Vocational Teacher Training and Research, Milwaukee Vocational School

THE secondary schools and the colleges and universities of the country are in the midst of an extended educational endeavor to render a vocational-guidance service to their students. Interest is keen in the development of this service and it is especially timely at this period to pause briefly and attempt to evaluate certain practices that have come about and also to state certain standards that seem to be essential to the growing movement.

The discussion of the subject, "Guidance Values of Vocational Information and Exploratory Activities," will consider (1) the general elements of the guidance problem; (2) vocational information and exploratory activities and their contribution to the guidance problem; (3) some standards of practice that are needed to obtain results; (4) certain conclusions that seem advisable to draw.

The General Elements of the Guidance Problem

The statement and a brief explanation of some of the goals that vocational guidance hopes to attain may well lay the groundwork of a discussion of the problem before us. The objectives of vocational guidance have been stated in many ways and frequently with considerable variation in the scope of its real function. An effort will be made to express these objectives as simply and as directly as possible. Vocational guidance as an organized educational effort, aims in part to aid in disclosing to individuals (1) their vocational interests; (2) their vocational aptitudes and abilities; (3) their personal and physical fitness for particular vocations. This effort at self-appraisal is solely for the purpose of aiding individuals to formulate a practical plan for their vocational life. A very brief discussion of each objective will serve to indicate more clearly the problem that is before us.

Vocational interests seem to be a basic factor in the selection of a lifework. Interest is not always indicative of ability, but it is synonymous with satisfaction or even pleasure. Satisfaction as a day to day or year to year element of our work is one of the keystones of a happy life. Therefore, an indication of existing vocational interests and a clue to potential interests are of import in determining a life's work.

Vocational aptitudes and abilities properly employed mean economic efficiency; improperly utilized they mean bungling and waste. The well-being of the individual and of the community requires that talents, such as they are, be at work making full and positive contributions according to their specific nature. Again the uncovering of evidence of occupational abilities or possibilities is one of the goals of vocational guidance.

Personal and physical fitness may be the elements that are distinctly assets or liabilities in the vocational field. Individuals may possess certain vocational interests, yes, even ability in the same fields and yet they may find that some element of a personal or physical nature bars the way to any great progress in the field. Thus again the laying bare of these qualities comes as one of the very practical aims of occupational guidance.

The effort thus far in our brief discussion has been to hold fast to the major elements of our problem, more particularly those having to do with "what" is to be done rather than with "how" it is to be accomplished. Thus with a reaffirming of our understanding of the elements of the problem we shall approach some of the practices that seem significant in the operation of an effective program.

Vocational Information and Exploratory Activities and Their Contribution to the Guidance Problem

Two procedures, namely, (1) the study of vocational information, and (2) exploratory activities, have been developing with the growth of the vocational-guidance movement. Vocational information is commonly accepted to mean organized descriptive material pertaining to the various occupations used for class or group study or discussion or for individual study. Sometimes this is supplemented by visits to plants, stores, etc., and by special speakers. Exploratory activities mean essentially at the present time organized vocational instruction offered in classrooms equipped with the tools, appliances, and materials of a variety of occupations. The problem that faces us in this discussion is an evaluation of the two above procedures in terms of the goals of vocational guidance.

It is well to recognize, first, that vocational guidance is not a problem of setting up means of aiding individuals to make fine, hair-line occupational discriminations. It is rather an agency that is attempting to disclose to the young men or women the existence

of certain personal qualities or potential qualities that have vocational-guidance significance. There are many of these personal qualities, but a limited number will indicate their nature.

1. The qualities of manipulative and muscular control that enable a person to perform with hand tools, machines, and appliances work of varying degrees of fineness and accuracy.

2. Certain mental qualities of patience and accuracy that enable a person to succeed with matters of routine or detail.

3. Certain mental qualities that enable a person to succeed with problems requiring powers of visualization, with abstract situations, or with problems of organization.

4. Certain mental and physical qualities that enable a person to convincingly and agreeably present opinions, arguments, or propositions.

5. Certain mental and physical qualities that are indicative of abilities to assume leadership.

6. Certain mental and physical qualities that are indicative of the presence of musical or other artistic talents.

Second, it is well also to recall constantly that vocational guidance in operation is finally a very personal and an individual matter. Any program of work with a vocational-guidance objective must, therefore, recognize that organized classwork serves at best only to introduce to the individual the problem of selecting a vocation.

With a recognition of some of the general possibilities and limitations of the practices it is pertinent to note certain more specific aspects of the problem under discussion. Vocational guidance, if it is worthy of time and effort, will aid in disclosing to individuals as stated before (1) their vocational interests; (2) their vocational aptitudes; and (3) their personal and physical fitness for particular vocations. What is it that we might expect a study of vocational information or exploratory vocational activities to contribute toward the accomplishment of these objectives?

Vocational-information studies in their present stage have taken the form largely of a textbook survey of occupations. There is nothing personal about the course and it is commencing to develop on the part of secondary-school students a viewpoint that it is a "dumb" subject. Of course, it is questionable whether the appelation should be applied to the subject or to some of the persons concerned. Will a study of a long list of vocations in a formal way disclose to a person his vocational interests and other qualities of a vocational significance? This question put to both teachers and students would probably bring forth a negative reply from many. Facing this situation, it seems desirable to approach the study of occupations on a group or individual basis. The grouping should be entirely, if possible, on the basis of the existing general vocational interests of students. It is conceivable that a small portion of the period might be devoted to a phase of the subject matter that is common to all occupations, but the greater portion of the time will be devoted to group and individual study and the working out of life-planning projects that will carry the student beyond the classroom in a search for information. It seems that in this way it may be possible to aid in developing a student's interest in the selection of a life's work and also to take certain of the introductory steps in the direction of revealing to the individual some of his vocational interests.

What may we expect of vocational information in the matter of revealing vocational aptitudes and abilities to an individual? Here it will probably be acknowledged that it has only limited values. Studying the details of numerous occupations may serve to recall past experiences of the individual and thus indicate certain vocational abilities or lack of them. This seems to be about the contribution of vocational information to the second big objective.

Personal and physical fitness may be partially uncovered for an individual by means of vocational information. A study of the specifications of various occupations may prompt the student to make a serious self-appraisal leading to a better understanding of what he has and what he does not have in the way of personal and physical qualifications for certain fields of work. The key for making vocational information of value for this aspect of the problem is with the teacher in making self-appraisal a very prominent part of the course.

Making Use of Exploratory Activities

Treating the second part of our problem in the same manner as the first we ask, "How can the exploratory activities be utilized in our educational institutions to aid in disclosing to individuals their vocational interest, abilities, and personal and physical fitness?" Exploratory activities, as they are discussed, will be narrowed to the vocational subjects offered in the average school system, although there should be suggestive implications for practically all subjects offered in the secondary-school level.

Exploratory vocational activities, if they are to disclose existing or potential vocational interests, must be organized and operated so as to afford work in a vocational environment. It is the surroundings and, in part, the conditions of the occupations reproduced in the schools that must serve this purpose in a very large measure if the goals of vocational guidance are to be approached.

Exploratory activities are probably the most desirable means to reveal vocational aptitudes and abilities. They possess the advantage over formal tests in that they may serve to develop aptitudes that would not be brought to light except through a range of vocational experiences. Exploratory activities, if they are to function, must afford vocational experiences in a considerable range of occupations. Jobs must be selected that will tend to show the personal aptitudes that exist or are possible of development. Probably the only way in which a range of occupations may be brought into the school is to recognize that all occupations have a natural grouping; for example, building trades, metal trades, office and selling occupations, etc., and that vocational group classrooms may be developed. This means a building-trades shop, a metal-trades shop, an electrical-trades shop, an office and selling occupations classroom, or any other practical-subjects classroom that seems necessary. In this

manner practical work in many occupations may be provided and a vocational study of many more related occupations may be undertaken.

If the exploratory activities have been well selected, well organized, and efficiently taught, the individual will meet numerous vocational situations involving jobs, tools, materials, conditions, and situations that truly represent in a very large measure the occupational environment. Some of the results of the experiences encountered in the environment should be a disclosure of general vocational qualities as well as some rather definite opinions in regard to working with different types and kinds of materials, tools, situations, people, etc.

Again, what is it that we may expect from the exploratory activities in indicating to any individual his personal and physical fitness for a vocation? If both the counselor and the student are fully aware of the objectives of the exploratory work, it is reasonable to expect that the individual will be conscious after a period of exposure of what his physical attributes or shortcomings are in terms of vocational specifications. In other words, the individual should know very definitely the part that eyesight, hearing, appearance, mental alertness, patience, the nervous system, etc., play in making a success in particular occupations.

Some Standards of Practice and Conclusions

As we have moved over various phases of the problem, the discussion has attempted to present certain interpretations in terms of the objectives of vocational guidance. Some of the suggestions may well be considered as standards while others lead only to certain conclusions. We shall, therefore, endeavor to summarize the discussion in the following manner:

1. Vocational guidance aims, in part, to aid individuals to ascertain their vocational interests, aptitudes, and their personal and physical fitness for occupations.

2. Vocational guidance does not necessarily aim to bring about fine, hair-line vocational decisions but rather a knowledge on the part of individuals of their personal qualities that have occupational significance.

3. Vocational guidance, in the final analysis, will always be a matter of adjusting an individual to an occupation and not a mass procedure.

4. Vocational information as a special subject will become a textbook exercise unless freedom is granted to students to investigate especially those occupations in which they have some interests.

5. Vocational information in and by itself has certain limitations that should be recognized. It may succeed in presenting a word picture of occupations, but it does not place the individual in a vocational atmosphere.

6. Every secondary-school subject should be so organized and taught as to contribute very definite occupational information pertaining to vocational fields related to it.

7. Exploratory activities, if they are to serve, must set up in the school a vocational environment. This may be obtained in part by organizing related occupations into groups and offering instruction accordingly.

8. Exploratory instruction must include both the practical phases of the occupations and the informational aspects that have guidance value.

9. Wherever vocational information or exploratory activities are offered, students must be fully conscious of the objectives of the effort and, further, they must be in accord with the spirit of the work and the plan that is followed.

10. All teachers are counselors and should possess information about the occupations related to their special subjects. Teachers of occupations and exploratory activities should possess an extended range of vocational information and understand the technique of using it to the advantage of the students.

Finally, as counselors let us be keenly alert and as we surround ourselves with certain practices, procedures, standards, and objectives, let us not lose sight of the greater goals of our endeavors. We are responsible for aiding the many with whom we are working to build the vocational portion of their plan of life. We have served effectively when the individual makes a discriminating vocational selection, enters into a period of preparation for his chosen work or enters upon it directly, and finds as a result of these experiences that his vocational judgment has been wholly sound.

The Teaching of Aeronautics in the Public Schools of the United States

Ammon Swope, Associate Professor of Industrial Education, Purdue University

WE are about to become a flying nation. Progress is being made so rapidly that information offered becomes dead in a few days. Commercial concerns are vying with each other in new ventures. Immense funds are being pooled and new organizations promoted. The youth of America is thinking in terms of flying, while young men are "soloing" and "barnstorming." Back of all this enthusiasm stands the government, eager to promote in every possible way the interest of its people in aviation. The public school is feeling the pressure of this wave of enthusiasm. It is this pressure that has stimulated the investigation of which this article is a report. Before entering into the report let us indicate the technical definitions of the subject we are about to discuss.

Aeronautics is defined by the aeronautics branch of the Department of Commerce as "the science and art pertaining to the flight of aircraft." Aviation is defined as "the art of operating heavier-than-air craft." Aerostation is "the art of operating lighter-than-air craft."

With the above definitions accepted as technically correct it is the purpose of this article to set forth the

efforts that are being attempted in the teaching of aeronautics in the public schools of this country on the "lower-than-college" level.

The writer was recently confronted with the problem of offering professional training to an aviator enrolled in a Smith-Hughes teacher-training class. The situation led to a nation-wide inquiry including all of the cities of one hundred thousand or more population as to the work undertaken, if any, in these cities. The response was immediate and generous. While no questionnaire was sent, the cities were asked to respond with any information they might care to offer as well as descriptive literature. Since the number of cities offering such work is limited, the letters received in reply, as well as mimeographed material and printed matter, indicate perhaps in a better way what is being done than a carefully compiled statistical statement.

Pioneering difficulties are apparent in most cases. This is particularly true in determining the particular phases of aeronautics to be offered. Many replies were received in which there was a frank expression of interest in the subject but no immediate possibility of definite instruction. In some cases this interest has resulted in the organization of a club as an extracurricular activity. In others it has taken the form of model airplane building in the regular organized shops. There is, of course, little emphasis on the engineering problems of the subject in the schools under consideration. A few replies indicate that there is a growing interest in the selection of teachers of this subject. One superintendent of schools says, "I will consider it a great favor if you will give me information as to whether we would be able to secure the services of a teacher of aeronautics from you. The course we are contemplating will begin about September, 1929."

Subjects of Instruction

Two types of instruction are offered. First, the regularly organized day-school instruction and, second, instruction in the evening school. Excerpts from the reply received from the Cass Technical High School, of Detroit, indicate the types of instruction. Eight distinct technical subjects are announced as included in the four-year aeronautics course. They are as follows:

I. Handwork with Tools.
II. Elementary Dynamics and Airplane Engine.
III. Automotive Electricity.
IV. Advanced Automotive Electricity and Navigation.
V. Heat Treatment and Acetylene and Arc Welding.
VI. Machine-Tool Methods.
VII. Engine Testing.
VIII. Wind Tunnel and Air Foils.

Mr. A. D. Althouse, head of the automotive department, with the help of his teachers, is said to have organized and conducted the first high-school classes in this country in aeronautics. He acknowledges the assistance of eighteen men prominent in aircraft manufacture and the automotive industry, army and navy officials and university men in the planning of the course indicated above.

A circular of information from the automotive department of the same high school announces evening classes in aeronautics with the following introduction: "The aeronautics course given in Cass Technical Evening High School are primarily for students who come under the provisions of the Smith-Hughes Law, in this case, men working in the aeronautical or allied industries. The purpose of these courses is to give complete instruction on aerodynamics and the airplane. Tools and equipment are provided free of charge." The subjects announced for evening-school instruction are as follows:

I. Elementary Aerodynamics.
II. Advanced Aerodynamics.
III. Elementary Airplane Construction.
IV. Advanced Airplane Construction.
V. Elementary Engines.
VI. Electrical Systems.
VII. Advanced Engines.
VIII. Airplane Design.
IX. Meterology and Navigation.
X. Welding and Metallurgy.
XI. Model Airplanes.

The Buffalo plan offers an interesting contrast in some of its phases to the Detroit plan. In his letter, Francis H. Wing, deputy superintendent of schools in charge of vocational education says, "Our efforts to date in providing instruction in the aeronautic field consists of the following: The trade-preparatory classes consisting of boys who have completed two years of the automobile-mechanics work and are now taking airplane, motor construction and repair. In night school we have two classes of 20 each in airplane construction and repair, and one class of 35 men in meterology and air navigation."

The above apparently represents the regular course work, but only a small part of the entire program. Quoting from the bulletin of the state education department to the schools of the state of New York, under date of November 15, 1928, we find this summary with regard to the work being done. "The Elm Vocational School of Buffalo is a pioneer in the field of airplane instruction, being one of the few schools to start such courses, although a number of colleges have flying clubs and courses. In May of this year the pupils of the Buffalo school formed the Aviation Club of Elm Vocational School, purchased a Waco Model No. 10, three-passenger airplane for $3150 and housed it in the hangars of the Buffalo airport.

"The club is an outgrowth of the automobile-mechanics department of the school. This department for some years has had several airplane motors and a Curtiss Oriole plane which was used for ground study only. In addition, the club has been acquiring a library on aviation. The next logical step was to purchase a training airplane to aid in training the members for licensed pilots.

"The club meets two evenings a week at the Elm Vocational School for a study of the principles of aviation and Saturdays and at other times at the Buffalo airport for instructions in airplane piloting. Local airplane interests are cooperating with the club and have provided special instruction, apparatus, and demonstration materials.

"Within a period of three months since organization, the club members in their airplane have made more than 1,000 landings, been in the air a period of 250 hours and covered a distance of 25,000 miles."

Cincinnati is in the midst of developing an extensive program which was started some time ago according to John F. Arundel, director of vocational education. He says, "We found out that some of our graduates have been going into aviation after they have trained in automotive mechanics. At the present time we have 16 boys who are in aviation work, four of them being pilots. Realizing that we must keep up with the times,

we have decided to offer a third and fourth year of advanced work in the automotive-trades schools for those who feel that they would like to go into groundwork in aviation."

At the beginning of the present school year, classes in aeronautics were organized in five different high-school centers in connection with the evening schools of St. Louis. As reported by Mr. B. J. Schakelford, director of school and community relations, the initial course as planned is given largely as an informational course consisting in a study and discussion of the theory of the airplane with its mathematical foundation, its history, safety, development, and possible application as a modern instrument of transportation. It is now proposed to make an intensive study of instruments and the airplane engine. Classes were largely attended.

Mr. A. L. Jordan, head of the science department of the Polytechnic High School, San Francisco, Calif., reports a course in aeronautics given in the eleventh year to students who have had algebra and plane geometry. The majority of these students are not preparing for college. The subject of instruction is that of elementary mechanics of flight, although no attempt is made to teach actual flying. Parallel related courses are being offered in the other departments of the school including shop practice in ignition and engines, navigation in connection with the mathematics department, and some aeroplane drafting in the mechanical-drawing department. A course is also being planned for the evening school.

Assistant Supt. S. H. Lake, of Cleveland, reports work in progress in the evening school. "We study the motors and controls and everything which has to do with the mechanical side of the airplane," he says. A course in day-school work is being planned for the second semester of 1928-29.

Quoting from a letter of Mr. A. G. Bauersfeld, director of technical work in high schools of Chicago, he says: "In three of four technical high schools we have classes which are based upon two semesters in auto mechanics. In other words, our three semesters' work in this department will be aeronautical, gas-engine work with the object of teaching groundwork and aviation for airports." He reports also twenty classes in aeronautics in the Chicago high schools in which the work centers around the idea of model airplane making.

The City of Portland reports work in the Benson Polytechnical School, of which Mr. C. E. Cleveland is principal. Quoting from his reply we find, "A four-year course in aviation, which was started this last September with an enrollment of 112 students. The course is designed to train airplane mechanics, and no instruction in flying is contemplated. For graduation, 22 units of academic work and 12 units of shop and drawing are required. The aviation shopwork is tentatively outlined as follows:

I. Theory of Flight.
II. Plane Construction.
III. Aviation Engines.
IV. Carburetion.
V. Aviation.
VI. Ignition.
VII. Instruments and Radio.
VIII. Advanced Rigging and Motor Tests.

The City of Indianapolis has recently undertaken definite instruction in the evening school of the Arsenal Technical Schools under the direction of Mr. Edward E. Greene, vice-principal. The work offered is a study of airplane construction and engines. Day-school instruction will be offered beginning in September, 1929.

Kansas City, Kans., reports an information class in connection with its evening school.

While no reply has been received from Los Angeles, a recent magazine article indicates that approximately 1,200 hours of instruction is offered covering a period of two years. The following units of instruction are offered:

I. Dissassembling and Assembling Planes.
II. Airplane Motors.
III. Plane Construction.
IV. Welding.
V. Instruments.
VI. Map Reading and Sketching.
VII. Navigation.
VIII. Meterology.

Equipment

The information in regard to equipment in use in the various schools is not very definite. The Elm Vocational School of Buffalo, has supplied the mimeographed material with regard to their own equipment, which is very suggestive. This short article will not permit a complete statement. It does include, however, a Waco No. 10 three-passenger airplane, purchased by the board of education of Buffalo, and an Elias-Stupar, five-passenger capacity, donated by G. Elias and Brother, Inc., Buffalo. In addition, the same company has provided such extra parts as propellers, wing assemblies, drawings, etc. The Curtiss Aeroplane Company presented engine parts, cylinders, pistons, connecting rods, wings and wing parts. The Wright Aeronautical Corporation donated photographs, drawings, etc., of their new "Whirlwind" engine. Other equipment is used which is not mentioned. This list of material is suggestive in the fact that it shows the interest of the board of education as well as of commercial concerns in public-school efforts. Buffalo is in the midst of a building program, which, when completed, will satisfactorily house extensive departments for aviation work.

Several cities are reporting study of instruments. No statement has been made by any city as to the instruments in use, but it is safe to assume that they are procurable. The City of Indianapolis has recently secured the loan of 12 engines of various types from the government field at Dayton, Ohio. One other city reports that it is about to receive such a loan. It is evident in many schools that emphasis is being placed in auto-mechanics courses in a study of internal-combustion engines with a view of later specialization in the various types of airplane engines. This means in practically every case where the departments have had gradual growth that the automotive-mechanics equipment is the equipment used in the elementary work in aviation study.

Cincinnati is following the above plan to some extent, as indicated in the reply from that city. Detroit has taken a similar position. Detroit further announces that tools and equipment are provided free of charge. San Francisco reports having built test apparatus including a well-shaped wind tunnel which will take wings and models that are about ten inches across. One teacher who is teaching his first course has brought into the class a small model airplane which he himself constructed. This model has been used to illustrate various principles of construction necessary in a study of the theory of flight. When one considers the multiplicity of types of construction involved in an airplane, it is evident, as some have suggested in the

replies, that practically every shop in the technical school is useful. The study shows that there is little material available for actual training in flight in the public schools. Some students are enrolled, however, who had flying experience. The projection devices found in most schools are used for instructional purposes.

Students

In general the students in the day school are made up of boys who are interested in vocational work. It is probable from the information received that many evening-school students are taking the course from the information standpoint with the view at some time participating in aviation work of some sort. One class is made up of a group of men who were previously organized as a club for the study of aviation. They now furnish the nucleus for an evening-school group. Cincinnati reports 16 boys in aviation work who have received their training in automobile mechanics, and 4 of them are now pilots. Buffalo reports 121 day and evening students in regular class instruction and 50 others enrolled in clubs sponsored by the vocational school. Seven members of one of these clubs have tried and passed their private pilot's license test. Indianapolis reports a number of men in various branches of aviation who received their preliminary work in the automobile departments of the school.

Instructors

The survey threw some light on the source of instructors. A number of men have been in training in New York University recently. One city reports that all of their instructors are men who had flying experience during the war. One teacher's case is probably typical. He is taking advantage of local opportunities in the preparation of himself as a teacher of aviation after having had a long experience in the machine shop and auto-mechanics work. He "soloed" recently, and in a relatively short time will be ready for a position as instructor. Inquiries have been received as to where teachers may be secured. No doubt the unusual commercial demand within the next few years will create enough interest so that we shall have men in training for commercial pilot's license who get their training through governmental agencies or private corporations who will offer other training in educational preparation than teaching. This phase of the work undoubtedly offers an opportunity for Smith-Hughes teacher training in some centers. The City of Chicago, which secures teachers through an examination system, has not as yet announced examinations for this type of work. The reply indicates that the demand is not great enough for this innovation.

Clubs

Many cities have reported interest in aviation clubs as extracurricular activities. Some of these are concerned with the making of model airplanes. Others are giving attention to flight. One club has created a fund for the actual purchase of equipment and machines for study. One superintendent of schools reports that model airplane making is being encouraged in the junior high school. These club organizations are, without doubt, having influence in promoting aviation study in the schools. Club work found in the junior high school will have its result as we have found in so many of the courses in the senior high school as a vocational reaction.

Literature of Instruction

An important problem confronting the teachers of aeronautics is one of securing satisfactory and reliable information for presentation to classes. Much of this information needs to be of the type that will enrich the experience and information of the teachers as well as furnish reading material for instruction of the students. Several distinct lines of information are available. The National Advisory Committee for aeronautics, under date of June 1, 1928, gives a list of reports in its bulletin with prices arranged under the following headings:

	Titles
Aerodynamics	18
Air Foils and Wing Section	29
Airplanes—Full-Scale Experiments	25
Airplanes—Model Experiments	17
Airships	77
Fuels	5
Gases	2
Helicopters	1
Instruments	29
Materials	7
Nomenclature	6
Parachutes	1
Propellers	20
Seaplanes	15
Wind Tunnels and Laboratories	10

There is also added a list of thirteen titles which have been published since June 1, 1928. These titles are reports based on experimental investigation and published by the committee. They may be secured from the Superintendent of Documents, Government Printing Office. In most cases they are available in the larger city libraries, technical libraries, and libraries of technical institutions.

Another valuable source of information dealing with this phase of the publication is the work of the Aeronautics Branch, Department of Commerce. Among the publications are the Domestic Air News, and the Aeronautics Bulletin. Aeronautics Bulletin No. 6 gives a list of aeronautical publications. In this bibliography may be found titles covering every phase of the subject, many of which may be read easily by the layman. One reference contained in this bulletin is to the bibliography of the Smithsonian Institution, which contains information from the earliest times to 1909. The Domestic Air News and the Aeronautics Bulletin may be obtained free on request. Quoting from No. 6 we find the statement, "The Department of Commerce also publishes airway bulletins, each of which describes one of the airports in the United States. These are printed to serve pilots on cross-country flights, being particularly designed to assist them in locating airports on their arrival at strange cities. There are at present 348 bulletins which may be obtained on specific request for the cities concerned."

Textbooks in the field are relatively few. One reply was received in which the writer said that he is preparing a textbook on the subject as he is presenting it. Undoubtedly others are working in the same way.

Conclusion

The question has arisen in the minds of some who reported as to the advisability of undertaking any form of aeronautics work in the schools. In fact, one city superintendent stated definitely that he did not believe it the proper use of public money to offer training in aviation because of the unusual expense. The reports, however, show that in most cases the work is being

carried on in the public schools with very little additional expense. In short, the schools are doing those things that they are already able to do because of staff and equipment. Clubs, on the other hand, organized as extracurricular organizations are investing money in order to train for actual flying. It is doubtful whether it would be advisable for the board of education to appropriate from the school funds any large amounts for training in flight at this time. This service, however, is bound to come. The government is encouraging aviation by loaning of certain types of equipment to schools under restricted conditions. The instructional possibilities at the present are limited in certain phases of aviation because of the lack of men sufficiently trained in essentials. It must be realized that the successful goal for most individuals who enter this field is to be able to pilot a plane. This involves a license. It must constantly be kept in mind that training will eventually need to meet this standard. The most acute problem faced by commercial concerns at the present time is to find men who are qualified as mentioned above and in addition men who have rare judgment necessary to meet emergency conditions of all sorts. They must, in addition to this, for commercial work, be men of such personality that they can deal successfully with a discriminating public. While we are still in the experimental stage in training, we could well look to the future as to the possible outlet for trainees. If the above assumptions are correct it will be necessary to differentiate in some cases the type of training to be offered to the students who apply for admission. It is possible that many should be rejected. Space will not permit a complete summary of what is being done by the government and commercial agencies, yet anyone who is in doubt as to the tremendous interest of the movement at the present time should consult the statistical records taking into account the number of machines, of the air pilot's license issued, total number of miles traveled, air highways, commercial and government airports, experimental work being undertaken by the government, and information furnished to civilian organizations. Every machine manufactured is potentially a demand for a pilot and for every pilot a number of mechanics. Our country has the resources and enthusiasm. What can the public schools do to coordinate them?

School Printed Junior-High-School Publications

R. Randolph Karch, Supervisor of Printing Education, Steubenville, Ohio

IN the Spring of 1929 the writer made a survey of junior-high-school publications. A mailing list of 574 junior high schools was procured, and questionnaires were sent out. Three hundred and ninety-seven schools returned them; a return of almost 70 per cent. A copy of the questionnaire is shown below.

City and State.....
Name of School.....
Name of Paper.....
Newspaper or Magazine Form.....Size Type.....
Frequency of Issue.....Number of Pages.....
Cost Yearly Subscription.....Per Copy....Free.....
Cols. to Page.....Size of Page.....Col. Width.....
Adver. .....Cir. .....School Enrollment.....
Staff—Jour. Class, Club, or Printers.....Stock.....
Number on Staff.....Faculty Advisers.....
Has School Prtg. Dept.?.....Number of Students.....
Is Your Paper Set Up and Printed in School Shop?.....
If Not, Why Not?.....
Is Paper Hand or Machine Set?.....
Name of Instructor in Printing.....

Of the 574 junior high schools on the mailing list, 272 have departments of printing. The following facts are taken from questionnaires returned from schools having printing departments:

Newspapers More Popular

The survey shows the newspaper form of publication as the most popular. One hundred thirty-six newspapers were reported, as against 78 magazines. Twenty-one junior high schools have either both newspaper and magazine, or what they call a "combination." Twenty-eight schools did not answer, and four have no official publication.

The general survey shows, that in certain localities one or the other of the two forms predominates. For instance, in the returns from Pennsylvania we find 29 magazines are issued, and only 14 newspapers. This reverses the findings of the national survey. On the other hand, of 38 returns received from California, 32 were newspapers, only two were magazines, two had both newspapers and magazines, and two were mimeographed.

Frequency of Issue

There are 28 weeklies in the newspaper group. Sixty-nine are issued every week, and 32 monthly. Three newspapers are issued every two months, two are issued quarterly, and one has no regular date of publication.

In the semimonthly group, the enrollments of the schools are less than in the weekly group, the average being 1,148. The maximum, however, is 4,000 and the minimum 377.

The average enrollment of the monthly newspaper group is 1,017, with a minimum of 200 and a maximum of 2,300.

Most junior high schools publishing weeklies have enrollments of from 1,500 to 3,400. However, we find two schools with enrollments of 450, and two of 800 printing weeklies. These are the only ones out of the 28 schools issuing weeklies, that have enrollments in three figures. The weeklies are, as a rule, small, only seven being over four columns wide. Semimonthlies are larger, and monthlies largest.

We naturally find more monthly magazines than any other. The survey shows 42 monthlies, five issued twice a month, seven quarterlies, two issued six times a year, and four three times a year. Only one weekly was found, four semiannuals, and two annuals. In almost every case with the magazines, those that are issued annually are the more massive, then come those which appear semiannually, and so on down the scale.

Sizes of Newspapers

The most popular size for junior-high-school newspapers is found to be the three-column style with page

size running from 7 by 10 to 10 by 14 in., and columns from 12 to 16 ems wide. This is true for weeklies, semi-monthlies, and monthlies. There are more 8 by 11-in. size newspapers then any other—no doubt because it cuts from the standard-size stock without waste. The 13-em column, of course, is used on pages of this size.

Sizes of Magazines

School publishers find the 6 by 9-in. size, often trimmed slightly smaller, best for the school magazine. The next popular size is the 8 by 11 in.

Advertisements

Advertisements bear the burden of expense of 58 of the 136 junior-high-school newspapers. Advertisements reduce the price of the publication to subscribers, and often result in free distribution. Thirty-eight magazines carry advertising, while 40 charge a bit more per copy and have a 100-per-cent news-content publication.

Most publications do not carry advertising, because of the fact that almost 90 per cent of the cost of issuing the project is saved by reason of it being printed in the school shop. However, advertising is desirable, on the other hand, on the score that the price per copy of the publication is reduced, thus enabling a larger percentage of the school pupils to subscribe. This is especially true of the schools in poorer districts. Often publications are issued free to the student body, the entire cost being met by advertisers. Again, changing copy and setting new ads is of the best practical experience to be given to students in printing. Salesmanship, bookkeeping, and other business practices enter into the running of advertisements, which is both interesting and profitable work for the students. It is noticed in the survey that the cost per copy is noticeably lower in those papers which take advantage of obtaining revenue by selling advertising.

"The Kennard Echo," Kennard Junior High School, Cleveland, Ohio. This monthly is hand-set, and printed one page at a time on a 12 by 18 C. & P. press. Albert W. Zepp, instructor.
"The Broadcaster," Theodore Roosevelt Junior High School, Syracuse, N. Y., is a very good example of the newspaper group that have their composition done by a trade composition plant, V. C. Bowman, instructor.
"The Harding Bee Hive," Steubenville, Ohio, is an example of the school-linotyped weekly group.
"The Binford Bulletin," Binford Junior High School, Richmond, Va., shows the trend in school magazines. Mr. Hughes, instructor.

A fair price should be charged for advertising, say the rate suggested by the National Editorial Association. Advertising should be sold on its own merits, and no "charity" advertising should be accepted at any time.

Circulation

Seventy per cent of junior-high-school newspapers are subscribed to by at least two thirds of the student body. Only 48 per cent of the junior-high-school magazines are supported by a like amount.

School-Printed Newspapers More Popular

Newspapers printed in the school shops are better supported in subscriptions than commercially printed papers. Only 53 per cent of the latter are supported by two thirds of the student body, while 69 per cent of the school-printed newspapers are supported by the same amount.

Strange as it may seem, the survey shows a negative result in considering the school-printed magazine. Magazines printed outside the school are more popular with the students than those printed inside. Sixty-six per cent of the schools printing their own magazines are supported by two thirds of the student body, while 73 per cent of the commercially printed magazines are supported by the same.

This is, no doubt, due to the fact that the average commercial printer is better equipped to produce a well-printed and larger magazine than the average junior-high-school printing shop. The school magazine, therefore, seems to suffer slightly when produced entirely in the school.

Clubs Becoming Popular

Of 100 school newspapers reporting, only 43 are controlled by the general elected or appointed staff, usually directed by the English department. Twenty-eight are managed by either the journalism class as a body, or a staff made up of members of the class. The newspaper clubs produce the content for 28 news sheets. The editorial content of two papers is written entirely by the printing students, making a 100-per-cent printshop project.

The school-printed magazines hold to the general staff, elected or appointed by the school at large, while commercially printed magazines favor the club. Thirty of the former are directed by the staff, while only 14 are put out by the clubs. The latter mentioned, however, have 25 favoring the club, and 12 the staff idea. Three are produced by the printers, and one has no staff.

Number of Staff

The magazine staff found in the survey average has 18 members. The maximum is 65 and the minimum is 4.

In the newspaper group the average is 20 pupils on the staff. The maximum is 84 and the minimum is 4. As a general rule, the staff number is in proportion to the size of the publication. It is common, however, to find that a small three-column newspaper has a staff numbering 80 or more.

Type Sizes

The larger part of the school publications are set in 10-point. This is, of course, the best size for junior-high-school students to handle. Eight-point type predominates when set on the machine in school plants and when set outside by trade plants.

Faculty Advisers

It falls to the lot of one teacher to supervise the writing of 23 per cent of the junior-high-school papers. Thirty-one per cent have two advisers. The maximum number of faculty advisers is 10.

The average faculty sponsors for the magazine group is 4, with a minimum of one and a maximum of 19.

Stock Used for Printing

Seventy-one per cent of the school publications of the junior high schools are printed on machine-finished book paper, and S. and S. C. bookstock. Only 22 per cent of the school newspapers are printed in regular news stock.

Hand- or Machine-Set

The question is frequently asked whether it is advisable for the junior-high-school publication to be hand-set by the printing students, or whether it should be composed by a trade plant, or whether the publication should be printed wholly outside the school printshop. These points are no doubt disputable.

Some of the foremost men in the field of printing education express the feeling that many junior-high-school printing instructors lose sight of the fact that it is not in the jurisdiction of their shops to teach printing—but to have general education as an objective, and the instruction based on the "exploratory course" plan.

Others say that if the school shop does not hand-set and print its own paper, the students are missing important lessons in equal spacing, sentence construction, use of capitals, arrangement of initials and letters, proper division of words, and general paragraphing.

Still others maintain that depriving the students of the opportunity to hand-set and print the school paper, deprives them of many wonderful lessons which the hand-set page embodies.

However, let us see what the survey brings out: Of the 267 junior high schools having printshops only four do not have an official publication. Thirty-two did not answer the questionnaire. This leaves a survey of 231 junior high schools.

Of these, only 98 hand-set and print their own publications. Fifteen possess linotypes, which produce the straight matter. Sixty-two have the composition for the school publication done by a trade composition plant, and only do the make-up and presswork. Sixty have their organs printed wholly outside the printing department. One does composition only for their paper. Following are the tabulated results:

Method	*Newspapers*	*Magazines*	*Total*
Hand-set and printed in school plant	51	47	98
Machine-set by pupils in school plant	11	4	15
Composition only (hand)	1	0	1
Set by trade composition plant; make-up and presswork by school shop	35	27	62
Produced wholly outside of school shop	38	22	60
			236
No. of publications			4
Did not answer in survey			32
Total on mailing list			272

Thus, only 41.5 per cent of junior-high-school printing departments hand-set and print the school publication, and 26.2 per cent have the composition done by a trade-composing room, and merely do make-up and

presswork. And 25.4 per cent have nothing whatever to do with the production of the junior-high school official organ.

The third from the last question on the questionnaire was not a popular one. It asks: "If publication is not printed in printing department, why not?" However, let us consider the answer of the approximate 40 per cent that assisted in the study:

"Not sufficient equipment" is the most popular answer. Others follow in order:

"Students not sufficiently advanced."
"Too large for presses."
"Too big a job."
"Production of paper does not fit in instruction."
"Pupils' work not practical."
"Seventh-grade students only."
"Takes too much class time to compose."
"Hand composition requires unneeded repetition."
"Time given to teaching."
"Too busy with school printing."
"Time too short."
"Half-time instructor."
"Cheaper to have it printed outside."

And quite a few say in effect: "Hand composition is not good trade practice, and therefore not good teaching practice. It kills interest and interferes with the proper instruction of a good course."

This shows a great difference of opinion among our junior-high-school printing instructors.

In the writer's opinion, it depends largely upon the size of the school plant, size of classes, and size of the publication, as to whether the organ should or should not be produced in the school plant. Very often executives expect the impossible in production from the junior-high-school instructor.

Safety Education in School Shops

Earl L. Bedell and George Peacock, Detroit, Mich.

NOT so long ago people began to realize that too many workers were losing their eyesight and becoming otherwise disabled through the maiming of their bodies, all due to injuries generally considered a part of the necessary hazards of the occupation. In our factories, workshops, and laboratories, there was too much danger of flying bits of steel, of poisonous dust, unbearable light, accidental explosions and unguarded machines, which deprived the operators of their health, happiness, and even life itself. Statistics were compiled. Laws regulating compensation for injuries were passed by legislatures. A National Safety Council, and 65 local safety councils in various cities were organized. Every industrial plant of importance added a safety engineer to its staff, and the state commenced to insist that factories pass a state inspection.

Now what can all this activity on the part of industry have to do with vocational education? Just this! Every course of study should have, as an integral part, a considerable space devoted to safety education. The school should accept the challenge of industry and cooperate with it toward the lessening of the pain, discomfort, and unhappiness which accompanies injuries. It has been proved that most accidents are preventable.

What can we in the school shops do about it? In our school shops we tried to visualize what needed to be done; in other words, we tried to state our objectives. Here are some picked at random from several submitted by the shop teachers.

1. To develop, through the habits of caution and prudence, an active and permanent safety consciousness.
2. To reveal to the student the fundamental hazards of industry and to develop an appreciation of the value of human life and limb.
3. To acquire and develop an emotional attitude in the student toward accident prevention that will function to their benefit both in school and outside of school.
4. To give the student an opportunity to participate in the school's effort toward the prevention of accidents.
5. Correct habit formation is the chief objective of shop safety.
6. The aim of safety education is to instill habits to do the safe thing.
7. To acquire a fund of general information on the subject of industrial safety.
8. The aim of safety education should be to produce habitual caution.

Now it is not enough to have abstract objectives. There must be something concrete. If it is to appeal to boys there must be action. Passive instruction does not instruct. The following methods were used to put action into our safety education.

1. *Shop Organization.* Every school-shop class in the city is organized and has a safety inspector. The student selected for this position wears a badge of office. It may be a pin or a special apron or a cap. The safety inspector educates himself and the students throughout the class period by endeavoring to keep everyone constantly alert in regard to safe practices. His further duty is to enforce all safety rules, keep the first-aid kit in good order and help in giving first aid when necessary. He is furnished a booklet of "Safety Regulations." Many teachers hold a quiz period and examine the class on the safety regulations. The safety inspector's term of office is usually about five days.

2. *Posters and Slogans.* Competitions are held in the school to produce posters and slogans illustrating some phase of safety education. Through the National Safety Council we were able to subscribe to a poster service. This made it possible to put a new poster in the shop every month during the past year. But I believe the homemade posters attracted more interest than the ones secured by subscription. Posters and slogans are given a prominent place in every shop and they are changed frequently.

3. *Safety Slides.* What I believe to be a very effective teaching device has been developed. A set of photographic slides illustrating a large number of hazardous things that should not be done in the machine shop has been made. It is a set of DON'TS, presented in an interesting way, and in a way which we find boys are willing to heed. Now this is the way these slides are being used:

The slide shown in Figure 1 is thrown on the screen. In the meantime cards bearing the numbers of the vari-

ous slides, have been given to the boys in the class. The boy who has card No. 1, rises and reads the paragraph on his card describing the picture. On the reverse side of the card are some questions which the boy having the floor now asks other members of the class. The answers provoke discussion, of course. In this way the complete set of slides are thrown on the screen.

Just to sit and look at a set of slides with a lecture delivered by the teacher would not do at all. The point is, of course, to have the class become active participants in the lesson.

The accompanying illustrations may serve as a suggestion to those who may desire to get photographs illustrating conditions in other shops or under other conditions.

Write-up for Slide in Figure 1
The Million-Dollar Smile!

Who wouldn't be happy to know that he is playing safe? Ready for work just like the men in the big factories. No tie, collar open for comfort, sleeves rolled up to the elbow and clothes protected by an apron. Machine-shop boys are practically always happy because they are making something and using machines that run. They will stay happier longer if safely dressed. Your mother and father work hard to dress you nicely. You should help them and yourself by wearing an apron. Aprons are given away as advertisements by many companies. Mother can make one easily out of oilcloth or canvas. If one cannot be got from home or outside source, it can be purchased from your school bookstore. Sweaters and coats should be taken off before operating machines. "Avoid wearing loose-fitting clothing, jewelry on the hands, or gloves around machine tools."

Questions

1. Why is wearing an apron in the shop the right thing to do as a protection to clothes? Why the safe thing?
2. Is an apron an expensive part of your equipment? If necessary, could you earn the price by working?
3. What type of apron is best? Should it be loose fitting or should it be made to draw up tight about you?
4. Do all boys of your age over the country enjoy the privileges you enjoy working in a machine shop?
5. If you lived in one of the many states in the U. S., where machine shop is not taught, would you enjoy school as much as you do now?
6. If many serious accidents were to happen in Detroit school shops, might the shops be discontinued?
7. Is it possible to operate the school shops without even a slight accident?
8. Have there been accidents in your class this semester? Do you call a scratch or small cut an accident? Can they become serious?
9. Who says, "Aw, that just can't happen to me?"
10. Who says, "I'm going to try not to let that happen to me?"

Write-up for Slide in Figure 2

"Sleeves Up," "Ties in,"—then "Stand Clear of the Machines" are the words to be used by the member of the class who turns on the power in the machine shop. The switch tender is telling his shopmates, "Tuck in that tie, too, before I turn on this switch." Prompt acceptance of such advice will prevent avoidable accidents. Repeat these actions day after day and you will soon have them as habits. Habits leading to the prevention of accidents pay. We should always tell the other person where to improve their safety. Likewise, we should listen when we are informed of our own dangers. Cooperation and courtesy will prevent accidents. "Instructors and students are to have sleeves rolled up to the elbows and loose-hanging ties so arranged as to prevent entanglement, while working on revolving machinery."

Questions

1. Why should we roll up our sleeves and tuck in our ties each day even if we know we are not going to operate a machine?
2. What are your ideas on the meaning of "avoidable accident?"
3. What connection can you think of between the words "habit" and "avoidable accident?"
4. What are the words that the student who turns on the power should say?
5. Why should the switch tender give the above warning before the power is turned on?
6. How many ways can you think of for a machine-shop student to apply the Golden Rule?
7. Are these boys fully prepared for work?
8. Pick out the phrase or phrases that you believe apply to machine-shop dress—"be neatly dressed," "be safely dressed," "be very well dressed."
9. How does the shop apron enter into the above three phrases?
10. What would your first action be if a boy got some part of his clothing caught in a machine?

Write-up for Slide in Figure 3
Boy Placing Belt on Line Shaft With Fingers

Place belts on line shafts with a belt hook. A belt hook is a long wooden stick, reaching nearly to the floor, having a metal pin projecting out at the upper end several inches. Here go four good fingers into the jaws of the pulley. They will be mashed and broken before they can be released. Don't try this boy's trick. You need all the fingers you have. You cannot grow new ones once they are gone. Don't take chances by putting them where you know, if you stop to think, that they will get mashed. Always stop, look, and think what is the thing to do. If you do not know, then ask your instructor. Usually you can decide the right way yourself, if you think. "When shifting overhead belts always use a stick reaching nearly to the floor." "Never attempt to stop a machine by grabbing a belt."

Questions

1. What, in your own words, is a belt hook or, as otherwise called, a belt stick?
2. Do you feel sure that you know what pain is? Where have you ever had your fingers squeezed?
3. How many fingers have you ever had broken?
4. Even if a broken finger mends all right as far as looks go, what about stiffness?
5. How would your family be affected if your father, or the wage earner in your home, lost two weeks' time because of several broken or smashed fingers?
6. Name as many jobs as you can think of that require ten good nimble fingers?
7. What relation exists between fingers and wages?
8. If this boy were in your class, what would you say to him? What else could you do?
9. If his fingers get caught, what would you do?
10. If a fire drill in school is a good thing in case of an imaginary fire, do you think that a power shut-off drill would be good in a machine shop? Why? How could it be worked?

Write-up for Slide in Figure 4
Boy's Tie Caught in Machine

This boy, because the machine was revolving slowly, saved himself from accident by throwing off the power. What might have been the story in a few seconds more? No doubt, an ugly gash or even a broken neck. He was lucky in having the machine in low speed. Better no tie on at all, around machines, than to have a dangling long one. There are many places where this boy's tie could get caught: in gears, grinder, drill, miller, pulley, and around shafts, etc. Tuck them into your shirt, or better yet, take them off while in the shop. You would not find it a pleasant task to help unwrap some boy after the completion of this sort of accident. "Students should endeavor to acquire habits of caution for their own protection and that of their shopmates. They should cultivate careful, thoughtful, and deliberate habits of work and develop a 'safety conscious' attitude of mind."

Questions

1. What might have happened to this boy in another second or so?
2. Was the lathe going fast or slow? Why do you believe so?
3. What are the necessary things to do to prevent this kind of accident?
4. What could you do to help this boy if you saw what was happening?
5. Name as many places as you can think of where a tie may get caught and wrapped up.
6. Is there any other kind of guard other than a mechanical one that we can use on machines? Are common sense and forethought guards? Why?
7. Are there any boys in your class that do not want to follow instructions about rolling up sleeves and tucking in ties?
8. Would an experience such as shown here cure them of their strongheadedness? Is such a cure going to be necessary?
9. What does "safety conscious" mean?

Write-up for Slide in Figure 5
Boys Wrestling in Shop

The machine shop is not a gymnasium! It should not be used as such at any time. The result may be too costly. We should pledge ourselves only to the most serious kind of work while in the shop. To have just a little fun is the excuse these boys may offer for this rough-and-ready play. But what would be the excuse if one boy's finger is lost? It often happens that this rough-housing results when two boys claim that they got to the machine first. Would not this be a good time to practice cooperation and work together? Would not the work be turned out faster and better? Let us try, next time, and see. Pull together always—it will prevent accidents. "Never fool with machinery nor run or scuffle in a shop." Remember this—the factory boss will not allow

any foolishness among his workmen. Therefore, don't form habits that you'll have to break later.

Questions

1. If this were a moving picture, what would you expect to see happen next?
2. What word meaning teamwork could you suggest as a solution for this tussle?
3. Which word should we think of most in a machine shop, cooperation or selfishness?
4. What would happen to these two boys if they were working in some large factory shop?
5. Why is the machine shop a good place to practice controlling one's temper?
6. Is it also a good place to practice all the phases of good citizenship?
7. Why do factories discourage this sort of thing?
8. Do you know whether or not factories must assume any responsibility for accidents to their employees?

Write-up for Slide in Figure 6
Long Hair Caught in Unguarded Pulley

Long hair for men ceased to be popular about the beginning of the industrial revolution. Modern boys who like medium-long hair should take warning. Hair must either be cut short or harnessed. This boy has a surprise coming to him very soon. He may become partly bald-headed. Do you think it will hurt? Pull out one hair then multiply the feeling by several hundred and you may get an idea of the pain he is about to experience. Nor may torn hair and a bald spot be the only injury. The sight of an eye, a wrenched neck, a broken nose or a flesh wound may easily be the result. "In operating drill presses, do not lean over so far that the hair may get caught in the belt or in a revolving spindle."

Questions

1. Could this happen to you on your shop drill press?
2. Is your drill press properly guarded?
3. Give several reasons for guarding this belt and pulley?
4. Where else may long hair become caught on this machine?
5. What other machines may present the same danger?
6. Would gears be a worse place than this in which to get hair caught? Is there a possibility for hair to get caught in gears?
7. What injuries may result in both cases?
8. What ways can be employed to keep long hair out of danger?
9. Was the industrial revolution a war? What was it?
10. How did it change old ways of living? Do you think it might have tended to change the length of men's hair? Why?

Write-up for Slide in Figure 7
Sleeve Caught in Drill

Are you superstitious? Do you believe it is bad luck to walk under a ladder? Do you think seven years bad luck will follow if a mirror is broken? If you do, what about reaching under a revolving drill? Don't trust in luck! Use your head and think in terms of safety. Even when sleeves are rolled up above the elbows the drill will do its deadly work if given the slightest chance. Walk around and push the table to the desired position. Go around the machine to get your tool. An open wound, a broken wrist or arm may easily be the result if you don't do so. Days and weeks out of work often have been the only reward for lazily trying to save one or two seconds.

Questions

1. Name several things for which this boy might have been reaching under the drill.
2. What kind of cloth will a drill catch in and roll up?
3. Does rolling up sleeves above the elbow help to prevent this? Does it entirely eliminate the chance? Why?
4. What are the injuries that may result?
5. What would you do to help this boy if you saw what was happening?
6. What would you do to help yourself if you were in his place?
7. If this boy were adjusting the position of the table when his sleeve caught, should he have had the power on?
8. When a workman is injured in a factory by his own negligence should his wages go on while he is off the job?
9. Does the employer just hire your hands or should a certain amount of brainwork go with them?
10. Is it not to your advantage to mix brain energy with the work of your hands? Does routine work kill thought necessarily?

Write-up for Slide in Figure 8
Boy Hit by Loose Hammer Head

"When accepting for use any equipment, examine it carefully and report any breaks or defects and thereby avoid possible accidents." It would have been better for these boys, especially for the one, to have checked this hammer at the tool crib. If it needed a new wedge they should have made one. Fix that loose or poorly adjusted tool if you can! Don't you take chances nor allow anyone else to do so. Is that not the way to become "safety conscious" in your work? If you are not careful it may be your bump to nurse, your eye to lose, or your tooth to get knocked out.

Questions

1. What has happened here?
2. What should these boys have done as they checked out their hammer?
3. If they could have made a wedge should they have taken time to do so or should they have checked out a better one?
4. If you expect to find all tools in repair each time you want to use them, what must you do about them?
5. In this case, who should have inspected the hammer?
6. Is it another case where it would have paid to have kept an eye on the other fellow?
7. How serious might this kind of accident prove?
8. How would you feel if you were the one who used the hammer?
9. What is the first-aid treatment for a severe bump or bruise?
10. What does "safety conscious" mean?

Write-up for Slide in Figure 9
Oily Rags Thrown in a Heap

"Grease-, oil-, or paint-soaked rags, waste, or other combustible materials of like character, shall be kept in approved self-closing metallic receptacles. These receptacles shall be kept safely clear of combustible surroundings and their contents shall be safely disposed of at least once each day." Such soaked rags, if thrown in this sort of heap, will cause a fire. Oil, of various kinds, slowly oxidizes or burns up. A smoldering fire results. Spontaneous combustion is the name given to this process. Carelessness is a more truthful name for it usually. Here we see a real fire combination. The rags should have been placed in the metal receptacle. The receptacle should not have been placed near such fire hazards as the anvil, forge, furnace, and the oil storage tank.

Questions

1. Do all oils and greases oxidize? Which ones oxidize most rapidly?
2. Why should the metal receptacle be "self-closing?"
3. If the receptacle is metal and fireproof, why should it be kept away from "combustible surroundings"?
4. Describe the process of spontaneous combustion?
5. Why should combustible materials be kept away from the anvil when it is used for forging?
6. Should the oil tank be kept near the furnace or forge?
7. In case you discovered a smoldering fire, what would you do?
8. What is a fire blanket? How do you use it to smother out a fire?
9. Do you know how to operate a fire extinguisher? Is your shop equipped with one?
10. Why is it essential not to lose your head in case of fire? Why does a crowd lose its head or become panic-stricken in case of fire?
11. If you discovered a fire in a crowded building, what would you do to avoid causing a panic?

Write-up for Slide in Figure 10
Boy Rendering First Aid

"Aw, I don't need to wrap this cut up—it's too small to bother about," is not the attitude we should have in any of our shops. Nor anywhere else. No matter how small the cut, there are always germs, thousands of them, just waiting to start infection in it. Blood poisoning may result in the loss of finger, hand, arm, or even life itself. Only a pin scratch may have been the starting point. Let a wound bleed for awhile. This helps to remove germs and dirt. Then flow some antiseptic solution, such as mercurochrome, over the wound and bind it up in sterilized gauze. Binding the wound up prevents new germs from entering and keeps out dirt. Protect your health while you have it. It's hard to regain it once it is gone.

Questions

1. What does this picture mean to you?
2. Why should we bind up even the smallest cut or scratch?
3. What material should we always use in binding up a cut?
4. Why is a dirty rag or handkerchief a poor substitute for sterilizing gauze?
5. What does sterilized mean?
6. Can you trace—step by step—the procedure in giving first aid to a cut finger?
7. Name several antiseptic solutions that can be used in treating cuts.
8. Why do we use mercurochrome instead of iodine in the school shops?
9. In using any kind of chemical or drug, why is it important to know if you have what you think you have?
10. How would you treat a burn?

Write-up for Slide in Figure 11
Boy Without Goggles at Grinder

What handicap do you think that the loss of an eye would impose upon you? Do you think that many employers would be just as ready to employ you? Would you rather be deaf, dumb, or blind? The worst, surely, is to be blind because you miss the

best things of life. Put yourself in the place of a groping blind man and keep the idea in mind when you step up to use the grinder. This boy by rubbing his eye with emery dust in it, may cause himself the loss of eyesight. Follow these rules: "Do not work on any unguarded grinding wheel. Always stand at one side of the wheel and wear approved goggles when grinding. Goggles must be kept clean and properly adjusted at all times. Grinding-wheel belts must be run slack. Keep toolrests of grinders close to the wheel. Under no conditions must this distance exceed ⅛ in."

Questions

1. Why is blindness the worst handicap?
2. What is the only way a blind person has of seeing?
3. What has a blind person to aid him in forming his mind pictures?
4. Is this an easier, faster, or more certain way of seeing the realities and beautiful things of life than to see them through two good eyes?
5. What should you do immediately after getting something in your eyes?
6. What do you mean by a "guarded wheel?"
7. Why should you stand at one side of the wheel?
8. Why must grinding-wheel belts be run slack?
9. Why should the toolrest be kept close to the wheel?
10. Is the grinder in this picture completely guarded? What would you recommend to be done?

Write-up for Slide in Figure 12
Boy Overlifting by Trying to Pick up Anvil

Overlifting is dangerous for anyone. It is especially so for growing boys because the bones and tissues of their bodies are not fully developed. Thus overlifting may create permanent and painful results in the form of rupture, strain of back and limbs, heart strain, or broken veins. It hardly pays to show someone else how strong you are by lifting more than you should. There are other ways of showing your strength that will not rob you of it later when you really need it. Whether in shop, home, or at some job, don't overlift. To develop your strength you must exercise in moderation.

Questions

1. What injuries may result from overlifting?
2. Why are young bodies unfit for lifting heavy weights?
3. How may you show your strength and still not suffer injuries?
4. What does "moderation" mean?

Promoting Shop Efficiency

J. E. Bond, High School, Warwick, N. Y.

FOR the shop instructor facing a different group of grade boys each day the accompanying charts and sketch suggest a solution to the problem of efficient clean-up.

Figure 1 represents the job-assignment chart. This chart consists of two disks, the outer one stationary, and the center one arranged so that it may be revolved. Upon the revolving disc are enumerated the various

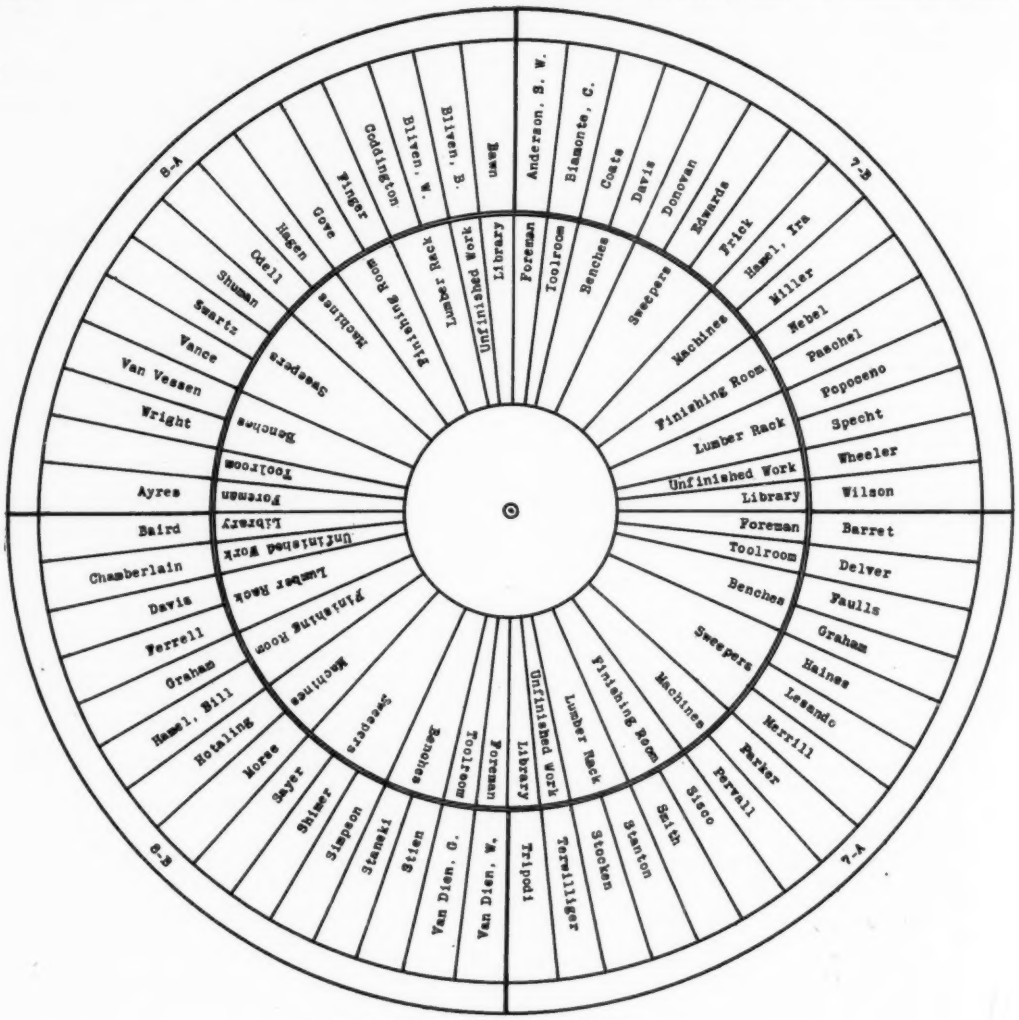

FIG. 1. JOB ASSIGNMENT CHART

SHOP EFFICIENCY CONTEST

Fall Term

WEEK	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Average
7-B	85	90	95	75	80	85	90	65													
7-A	75	80	80	70	80	90	80	95													
8-B	90	80	85	80	82	95	85	80													
8-A	95	95	60	75	85	90	85	90													
	Spring Term																				
7-B																					
7-A																					
8-B																					
8-A																					

FIG. 2

jobs necessary in cleaning up the shop. The average class consists of fifteen boys. Working upon this basis and taking into consideration the fact that some jobs will require more boys than others, the jobs are assigned to the fifteen boys in the following manner: One foreman to supervise the clean-up; one toolroom man, who has charge of the toolroom, and who checks the tools in and out; two benchmen to line up the benches, and check up on the cleanliness of each bench; three sweepers; two machinery men to clean up and oil the machines; two men to clean up the finishing room; two men to take care of the lumber rack, sweep up around it, and straighten the lumber into neat piles; one man to put away unfinished work; and one library man who straightens up the books and magazines on the reference shelves.

These jobs are arranged on the job disc in the following manner. Describe upon a sheet of heavy white cardboard a circle with a radius of six inches. From the same center describe another circle with a radius of three inches. Quarter these two circles with two lines at right angles to each other, and divide each quarter into fifteen equal parts, drawing a line from the center of the circle to each point. Each quarter will then accommodate the names of the boys in one of the four classes.

By dividing the fifteen sections of each quarter of the center circle according to the job assignment, it can be seen that by revolving this disc each week, each boy will have a new job. Another advantage of this device is that each boy has a chance at each job on the list. The boys soon become accustomed to this method, and in a short while will head for the "Job Chart" as soon as they enter the classroom. Figure 1 shows the construction of this chart. Due to the fact that some classes are larger than others, it will sometimes be necessary to double the number of boys on a job. As each new class comes into the shop the chart is turned so that there is a new foreman each week. The discs are attached to the wall with thumb tacks, the center disc being the one which revolves.

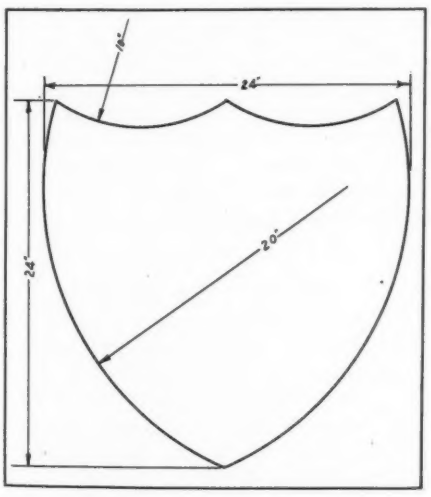

FIG. 3

Supplementing this job chart is another (Fig. 2), which becomes a permanent record of the efficiency grade which each class gets from the instructor. At the end of each week, the class having the highest average for shop efficiency earns the "Shop Efficiency Honor Shield." This shield (Fig. 3) is finished in walnut and the words "Shop Efficiency Honor" are lettered upon it in gold.

The system has been used for a year in the author's classes, and has proved very satisfactory.

THE FIRST DAY

C. M. Gilmore, Hazard High School, Hazard, Ky.

THE first day of school is an all-important day. Especially is this true if you are just entering into a school system, or if you are beginning your first year of teaching. What you do on the first day of school will materially help or seriously retard your future progress. Well-defined plans are absolutely essential for the opening day, if it is to be positively successful. Your plans should be well thought out and definitely established in your mind several days prior to the beginning of the year's work.

In addition to well-laid-out plans for the first day, other very important items should be looked after. A suggestive list of these follows:

1. Your shop should be clean, orderly, and well arranged.
2. Your tools should be in definite places and in prime condition.
3. You should be in the best physical condition possible.
4. Your personal appearance should be clean and neat.
5. You should know what grade pupils to expect, the approximate number, and the scheduled times of arrival of the different classes.
6. You should be prepared to enter upon a definite course of procedure the moment your pupils arrive.
7. Each item that you plan to use should be at hand.
8. You should give your pupils something worth while the very first day.
9. You should be supplied with crayon, sharpened lead pencils, copy paper.
10. Your first-aid kit should be properly supplied.

PRINTING

Printing is the bridge of time uniting yesterday with today, and over which passes most of the world's history, and by which we record the world's progress, valor, aims, and achievements. Printing is the greatest inventive gift to mankind, affording enlightenment, education, comfort, and entertainment.—*John S. Pinney.*

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

THE FAILURE OF THE SCHOOLS

Industrial leaders, and speakers on industrial subjects, frequently bewail the fact that the school shops do not prepare the young for entering the industries. They say that this or that shop course in the high school does not fulfill its duty, and that industry is forced to undo much that the schools have done. Statements of this kind are quickly made and they sound quite conclusive. It is true, the schools do not do all that they attempt to accomplish. No one knows that better than the schools themselves. It is equally true, however, that industry does not accomplish all that it attempts. As a matter of fact, every industry has its scrap heap, not only material but human as well.

Before one can make a sweeping statement that a school shop course is a failure, it is well to know the objective of the given course. It is hardly to be expected that a shop course given in a high school one or two, or even five 90-minute periods per week, should turn out full-fledged mechanics. Industry insists that its apprentices must spend at least four, five, or more years in daily full-time practice at their trade, before they can be classed as journeymen. Foremen and superintendents will again and again remind these apprentices that it is only after they have finished their time of indenture, that they will begin to learn their trade, and yet these same men who claim to teach trades and then inform their students that the trade will first be learned after the studying period is past, wag their heads and speak pityingly of what the school accomplishes. The trouble is that these men do not know what the school is attempting. The short time that can be devoted to shopwork in the average high school will only give the student familiarity with the performance of some of the most fundamental operations and processes of a given trade. With this familiarity, the student receives some knowledge of the principal materials used in that trade.

Outside of the full-time vocational school, the high-school shop courses offered, do not have the preparation of tradesmen in view. Their objective is to arouse interest in the trade, and to give the student some knowledge so that he is not forced to enter industry entirely unprepared to cope with the new situations that surround him.

The inefficiency of industry in preparing its workers was plainly shown during the world war when a schoolman, Charles R. Allen, showed industry how to analyze the teaching of its own jobs and operations, and actually cut down the time which had been required to prepare workers to a small fraction of that formerly required.

In some cases the school has tried to find out from industry what is wanted. Questionnaires that have been sent out from time to time in attempts to help the school in formulating just what should be comprised in a given course, have shown conclusively that industry and commerce do not know just what they want. The answers received to questions asked of machine-shop foremen, relative to the amount of arithmetic required by the journeyman machinst, produced information varying from "a machinist needs to know little or nothing beyond the arithmetic required in the use of the ordinary measuring devices," to "a machinist, to be successful, should be well versed in algebra and trigonometry." A questionnaire sent out by a teacher who was trying to make her instruction for office boys as practical as possible, brought out the information that boys should be well versed in English, grammar, geography, and that above all they should know how to write a good business letter and be able to write telegrams. It might be enlightening to learn how many office boys are required to write business letters and telegrams.

Men in industry seem to forget that the same thing can be accomplished in a variety of ways. For instance, in the one drafting room, the chief draftsman may insist that the lettering be vertical, in another that it should be slant. In the one, drawings should be shaded, in the other, shading is not even permitted. In the one, plain lettering is required, the other insists upon "fancy" lettering. With requirements varying between such limits, the school is hard pressed to know what should be done, yet each individual will demand that his requirements be met, and if they are not met, will glibly charge the school with failure.

The method which is being accepted, and more and more followed is to invite industry to participate in the planning of work to be given at schools. This is a step in the right direction because it helps industry and the business man to see the problem from the school side and it also helps the school to plan courses which more nearly meet the objectives required by practical work.

What the school needs most of all is (1) perpetual self-appraisement which permits it to see its own shortcomings, (2) a determination to devise means for overcoming defects, (3) a rigid upgrading of its teachers, especially those of trade subjects, even if these be teaching shopwork in the general high school. Shop teachers should be able to impart to their students a manner of doing jobs acceptable to industry, (4) an organization that is flexible enough to adapt its instructional material quickly to the needs as they are found to exist, (5) a program of publicity that will educate the public about the objectives of the courses that are given at school, thus preparing the taxpayers to intelligently judge the school's problems in the light of these objectives.

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THE GOLDEN RULE

Most teachers remember the first day of their teaching experience. How woefully lost they felt when the many little details of their new position crowded in upon them. How they would have welcomed a little help from someone who could have answered the numerous questions which confronted them.

With the opening of school a few weeks hence, there will be many new teachers entering their first year.

Would it not be a fine thing if the veterans who have finished their first year, would give a little assistance to those who come within their sphere of activity? Tell the new men something about how to keep their records, their equipment, and their supplies, how to make out their requisitions, what to avoid, etc.

Recently a teacher paid more than $200 to his school district because he did not keep his material accounts straight. Probably he was a little short in this part of his education; probably he was a little careless; but he would have been saved a great deal of money, and a whole lot of embarrassment and ill feeling if someone had taken a friendly interest in him, and had pointed out the necessity of keeping these accounts in the proper manner. Of course, he should have been careful with his accounts, but probably the seriousness of this part of the teacher's business had never been stressed with him. He, no doubt, emphasized his teaching activities at the expense of the bookkeeping which should have accompanied these activities. He did not realize the presence of the impending danger until he was confronted with the deficiency which existed between the amount of material that had been delivered to him, and the amount of material at hand plus the cash for the materials which he had sold during the school year. It was a bitter lesson which he might have been spared had someone taken a friendly interest in him. There are so many little details which might be called to the new teacher's attention, which would ultimately save him a great deal of trouble, mental anxiety, disgrace, embarrassment, and professional prestige.

Some of these new teachers have not yet learned very much about the ethics of their profession. Their actions very often predispose those in administrative positions against them. A little friendly word of warning from an older teacher may put them on the right track. Many a young man has lost the opportunity of obtaining a coveted position merely by a few statements made in the wrong way. Many a young man has been hampered from advancing by the puffing of a cigaret at the wrong time or at the wrong place. Many of these little deeds so adversely criticized have been thoughtlessly performed. If someone had informed these young candidates who did not know from their own experiences what to do or how to do it, they might have at least been given a chance.

In shop classes the boy is taught to act according to the Golden Rule. Why should not the teachers also practice it by helping those who are just entering upon their new duties as teachers?

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THE PROFESSIONAL ATTITUDE

The opening of the school year is fast approaching. Every year ought to see the teacher advance in his profession. If he has not progressed as rapidly as he desires, is it probably due to the fact that he has not had the right professional attitude? This professional attitude is something which can be developed. It means more than merely holding down a job in the classroom. It means more than merely giving the students a mass of facts about materials, skills, and accomplishments. It means more, than all of the things enumerated, because it also means a personal attitude toward surrounding things and individuals. It means the definite setting of standards, not only in the school shop, but also in the teacher's life. It means cooperation with fellow teachers and with the administrative officers of the school. It means the whole-hearted carrying out of policies which may further the advancement of others more than the advancement of self. It means the unselfish expenditure of time to help others get more out of this life. It means the keeping abreast of the times by reading the literature which records the past, the present, and the future of the things that pertain to the teaching profession. It means the expenditure of energy and time and money in professional organizations, be they local, state, or national, knowing that professional growth of the individual is tied up with the professional growth of all who belong to the teaching fraternity.

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WHAT MAY THE FUTURE BRING

Recently a teacher of millinery, who had served faithfully for a number of years in a certain city, was dismissed because there was so little call for a course in millinery, that it had been decided to drop it. This teacher had been quite successful in her work, and had obtained a life certificate limited to the teaching of the aforementioned subject only. When the course which she had been teaching was discontinued, she was not prepared to teach anything else. In spite of strenuous efforts to retain her position, she was dismissed. The case was taken into the circuit court and finally into the supreme court of her state, and the decision rendered in each case upheld the board of education in dismissing a teacher whose certificate was limited to teach a subject which was no longer to be taught.

Unfortunately, this woman had failed to see the handwriting on the wall. Industrial conditions are changing rapidly, and a trade which pays exceedingly well today may be superseded or made unnecessary by new developments and inventions within a year. No doubt, the woman was a competent teacher, but she had failed to prepare for teaching something beside her own specialty, and when that specialty was no longer wanted, she had nothing to offer which was of any use in the school.

Trade teachers will do well to acquire at least the rudiments of other trades, allied to their specialty if that seems desirable, but trades which will help them in case their own becomes superannuated. We are living in an age when great adaptability is required of everyone. The old advice of having more than one string to your bow is as valuable today as it ever was.

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THE PURPOSE OF THE INDUSTRIAL ARTS

There is need of a wider vision. There is too much of a tendency to have a shop for the shop's sake and not enough for the boy's sake. The great purpose of industrial arts is to teach certain important elements in civilization — to represent the industrial and mechanical side of our civilization within the school border.—*Lewis Gustafson.*

A System of Accounting for the Industrial Arts Shop

Charles R. Kinison, University of Illinois

"MR. A.," said the superintendent of schools, "you owe the school district $264.45. What are you going to do about it?"

Mr. A. was the instructor of industrial arts in the school system of a central Illinois city, and the aforementioned interview took place about one month before the close of school.

This particular superintendent is known to be unusually strict in the keeping of the accounts of the school district and keeps a close watch on the receipts and expenditures. He knew to the exact cent just how much the industrial-arts instructor should turn over to him in order that the receipts of the department might balance the expenditures. What is more, he collected the stated amount from the instructor.

What industrial-arts instructor can afford to pay such an amount out of his wages to his school district? The fault, of course, lay with the instructor because he failed to keep the accounts of his department in such a way as to know just what the expenditures had been. His system of keeping the personal accounts of the members of his class no doubt were inadequate; he may have been negligent in the keeping of these accounts; his beginning inventory and his closing inventory may not have been correct; and one or more of several reasons may be given for the failure of the instructor to make the proper return.

It was a very expensive lesson for this particular instructor, but because of the large amount involved, it was important that the superintendent should collect the money for the district. It was with the hope of preventing occurrences of this kind that the system of accounting here described has been devised.

An accounting system for the industrial-arts class is necessary for the following reasons:

1. Because there is a certain amount of money involved.
2. Because the administrator needs exact information about the financing of the industrial-arts department.
3. Because the instructor needs a systematic method of taking care of the money that comes into his department.
4. Because the parent desires to know how the money is taken care of.
5. Because the pupils get valuable experience by using the system.

The amount of money which is involved is determined by the number of students enrolled and the kind of projects which are constructed. The instructor in one of the larger schools may serve more than a hundred students, and if each student pays $5 for supplies, it is a matter of $500. In a school where ten manual-training instructors are employed, the sum is multiplied by ten. The projects which are constructed vary in size and cost with the abilities of the students and with the size and equipment of the shop.

During the "open house" of one of our high schools last spring, a complete dining-room suite was among the exhibits. The set consisted of a gate-leg table, a buffet, a serving table, and several chairs. It was made of American black walnut. It is quite common for boys to make telephone stands, typewriter desks, breakfast tables, library tabes, radio console cabinets, end tables, and many other projects equally large and expensive. When the cost of these articles is considered, it can be seen that the estimate of $5 per pupil is very conservative.

Accounting Methods Now in Use

In some schools the board of education pays for all of the materials and supplies, and the pupils who are enrolled in the industrial-arts classes are allowed to take their finished products without paying for them. This practice does not require any financial accounting on the part of the industrial-arts instructor. This practice will cause the course to lose a part of its value to the student, for it will not give him the practice in keeping accounts, and it will not give him the proper knowledge of the intrinsic value of the materials which he uses.

Another method that is used in many schools is to require each student to bring all of the materials for his projects. Schools which use this plan do not keep any stock of supplies except a limited supply of brads, nails and screws, glue, and possibly some finishing materials. This plan has the advantage of saving the instructor the trouble of keeping any stores and of keeping accounts. The boys get the knowledge of the value of their materials, but they do not get the practice in keeping accounts. It is often difficult to obtain the material which the boy needs. Only the larger towns will be able to supply these materials without making a special order for them. Special orders mean higher prices and delay. What will the boy do while his order is on the way? It is very difficult for the instructor to get the boy to foresee just what materials he will need very far in advance. It may be a good thing to teach the boy to make fairly accurate estimates of the materials he needs, but the disadvantages far outweigh the advantages of this plan.

There is a method of procedure that is more common than either of these. Where this method is used, the board of education pays the bills for materials as they are presented. The instructor determines the value of the materials used by the boy and collects that amount from him. At the end of the year the total amount collected by the instructor is turned over to the principal, who turns it over to the secretary of the board of education or to the township treasurer. In this way the money passes through the hands of two or three people, and no accounting is made for any of it. This is the greatest disadvantage of the plan, and if some scheme can be made whereby this disadvantage is overcome, there is no reason to believe otherwise than that it will accomplish great good.

A Proposed Method of Accounting for Materials

The stores division of the industrial-arts department should be self-supporting. This means that all money advanced by the board of education for the purchase

of materials should be repaid by the department as the materials are used. The value of the stock on hand plus the amount of sales should equal or exceed the amount advanced by the board.

The accounting system which is to take care that these two accounts balance, must be as simple as possible to accomplish its purpose, for the average industrial-arts teacher knows very little about accounting, and it is he who has to keep these accounts. For this reason the number of record forms has been reduced to a minimum. Only five record forms are necessary: (1) a ledger, (2) deposit slips, (3) sales slips, (4) continuous stores records, and (5) inventory forms.

The ledger contains an account for each boy in the class, and also an account for the board of education. Each boy's account will show how much money he has deposited and also the amount of each purchase he has made. The board-of-education account will show the amount of the inventory at the beginning of the year, the amounts paid by the board for materials purchased, and the amounts deposited by each boy. Each

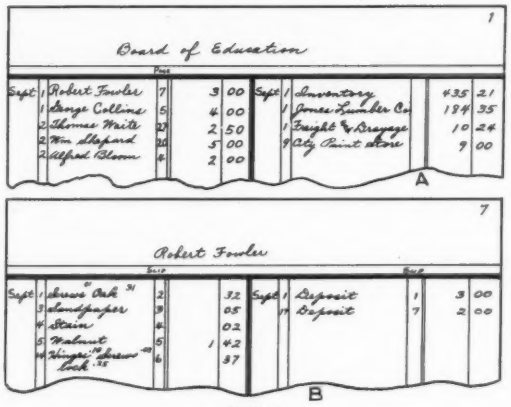

1
Board of Education
Page
Sept 1 Robert Fowler 7 3 00
1 Jorge Collins 5 4 00
2 Thomas Waite 23 2 50
2 Wm Shepard 24 5 00
2 Alfred Bloom 6 2 00
Sept 1 Inventory 435 21
1 Jones Lumber Co 194 35
1 Freight & Drayage 10 24
9 City Paint store 9 00
A
7
Robert Fowler
Sept 1 shoes "Oak" 31 2 32
3 sandpaper 3 05
4 Stain 4 02
5 Walnut 5 1 42
14 Hinges "Brown" 29 6 87
Lock "35
Sept 1 Deposit 1 3 00
11 Deposit 7 2 00
B

FIG. 1

boy's account will show a credit for each deposit and a debit for each purchase. These will be posted directly from the sales slips. The board-of-education account will be credited with the amount of the inventory at the beginning of the year, and with the amount of each bill that is paid by the board, including all expenses connected with the transaction. The amount each boy deposits will be debited to this account. At the end of the year when all other accounts are closed, the difference between the credits and debits of this account should be equal to the value of the stores on hand. Two sample pages of the ledger are shown in Figure 1.

An account in the name of the "Industrial-Arts Department," can be opened at a bank that is convenient to the school. This should be a joint account, requiring the signatures of both principal and instructor on the check for the withdrawal of money. It should be understood when opening the account that no money will be withdrawn until the end of the school year at which time the account will be closed and the money deposited with the township treasurer to the account of the school district. Under such terms the bank can afford to care for the account, not only because it will be assured of having the money for its own use during the time it is on deposit, but also because it will be brought into contact with the boys of the class, who represent prospective customers.

The deposit slips can be obtained from the bank, and the heading can be printed with a rubber stamp so that the account heading will be sure to be the same on each deposit slip. When a boy wishes to make a deposit, he makes out two deposit slips exactly alike. He takes these slips, together with the deposit, to the

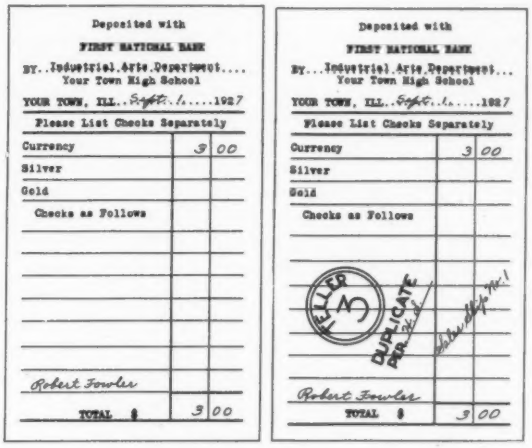


FIG. 2

bank. The bank teller keeps the deposit and one deposit slip. The other deposit slip is stamped "Duplicate" by the bank teller and returned to the boy. The boy makes out a sales slip for the amount of the deposit and presents it, together with the duplicate deposit slip, to the instructor, who marks the serial number of the sales slip on the deposit slip and returns the slip to the boy. This is the boy's receipt. The sales slip number which the instructor puts on the deposit slip is insurance against giving the boy credit twice for the same deposit. Sample deposit slips are insurance against giving the boy credit twice for the same deposit.

Sample deposit slips are shown in Figure 2.

All sales and deposits are posted from the sales slips. Each boy is required to buy a duplicating sales book containing both original and duplicate sales slips. These are numbered serially so as to make an easy posting

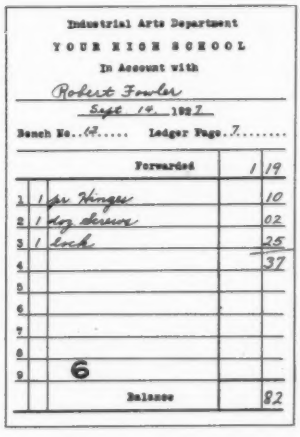


FIG. 3

reference. In order to have these books uniform, the school can have a supply made to order and can sell them to the boys on their account. A sales slip must

STORES RECORD Lumber Room

Walnut 1"		Walnut 2"		Mahogany 1"		Mahogany 2"		Oak (4) 1"		Oak (4) 2"		Cherry 1"		Che
In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	I
247	4.0	321	7.0	236	2.2	127	2.0	257	10	78	8	4.2		
207	2.6	314	12.5	233.8	7.1	125	10.0	247	11	70				
204.4	5.5	301.5		226.7		115		236						
204.9						100								
						215								

FIG. 4

be filled out for each purchase and deposit that is made. The original sales slip is handed to the instructor at the time the material is taken from the stockroom. The instructor checks the sales slip immediately for errors in calculations. When the sales slip is correct, he files it in a safe place until he takes the time to post these to the ledger. After they have been posted, the slips are filed away in regular order for reference should any difficulty or misunderstanding arise. A sample sales slip is shown in Figure 3.

The continuous stores record should be placed in a convenient place just inside the storeroom. This record can be kept on a large sheet of cardboard, which may be tacked to the wall. If supplies are kept in several cabinets or drawers about the shop, a stores record should be kept for each cabinet. These records should be conveniently located so that entries can be made with a minimum of effort. Each stores record will contain two columns for each kind of material in the room or cabinet. One column will show additions to the supply, and the other will show subtractions from the supply. By running a horizontal line under each entry and performing the calculations, the number under the line in the "additions" column will represent the present supply. A glance at this sheet warns the instructor when it is time to replenish his stock. A sample stores record is shown as Figure 4.

The final form of this series is the inventory check list. This is a form for taking the annual inventory. It has a column for listing the name of the article, another for the amount on hand; the third column is for the name of the unit of measure, such as feet, dozens, gallons, etc.; the fourth column is for the unit value at shop prices; the last column is for the total value of the stock on hand. It is presumed that all stock is sold at cost, and the shop prices as shown on the inventory check list as are also the cost prices. A sample check list is shown in Figure 5.

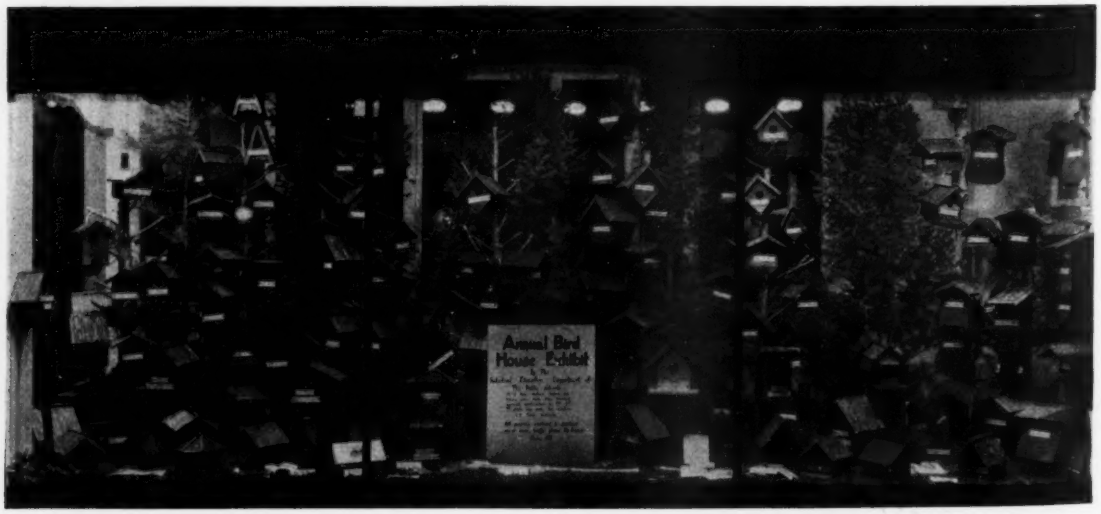
The use of this system, consisting of the ledger, the deposit slips, the sales slips, the stores record, and the inventory check list, will be advantageous in several ways. In the first place, it accounts for all of the money that is involved in the handling of industrial-arts supplies by the schools. In the second place, it provides exact information in convenient form for the use of the principal or superintendent. In the third place, it relieves the instructor of handling any of the money and provides a simple scheme for accounting for the

INVENTORY CHECK LIST

ARTICLE	AMOUNT ON HAND	UNIT	UNIT VALUE	TOTAL VALUE
Oak, Quartered 1"				
Oak, Quartered 2"				
Oak, Plain 1"				
Oak, Plain 2"				
Walnut, 1"				
Walnut, 2"				
Cherry, 1"				
Cherry, 2"				
Sycamore, 1"				
Sycamore, 2"				
TOTAL				

FIG. 5

materials and supplies. This will allay any possible suspicion that the instructor can be profiting from the sale of materials. Again, this scheme shows to the parent that the money is being taken care of by bankers, whose business it is to take care of money. And lastly, it furnishes valuable training to the student by requiring him to fill out business forms (sales slips and deposit slips) and to transact business at the bank.



THE 5TH, 6TH, AND 7TH GRADE MANUAL-TRAINING CLASSES, HELENA, MONT., BUILD INVITING BIRD BUNGALOWS. C. E. PRUNER, INSTRUCTOR.

TRACING SUPPLEMENT No. 142
THE INDUSTRIAL-ARTS MAGAZINE
SEPTEMBER, 1929

TRACING SUPPLEMENT No. 147
THE INDUSTRIAL-ARTS MAGAZINE,
SEPTEMBER, 1929

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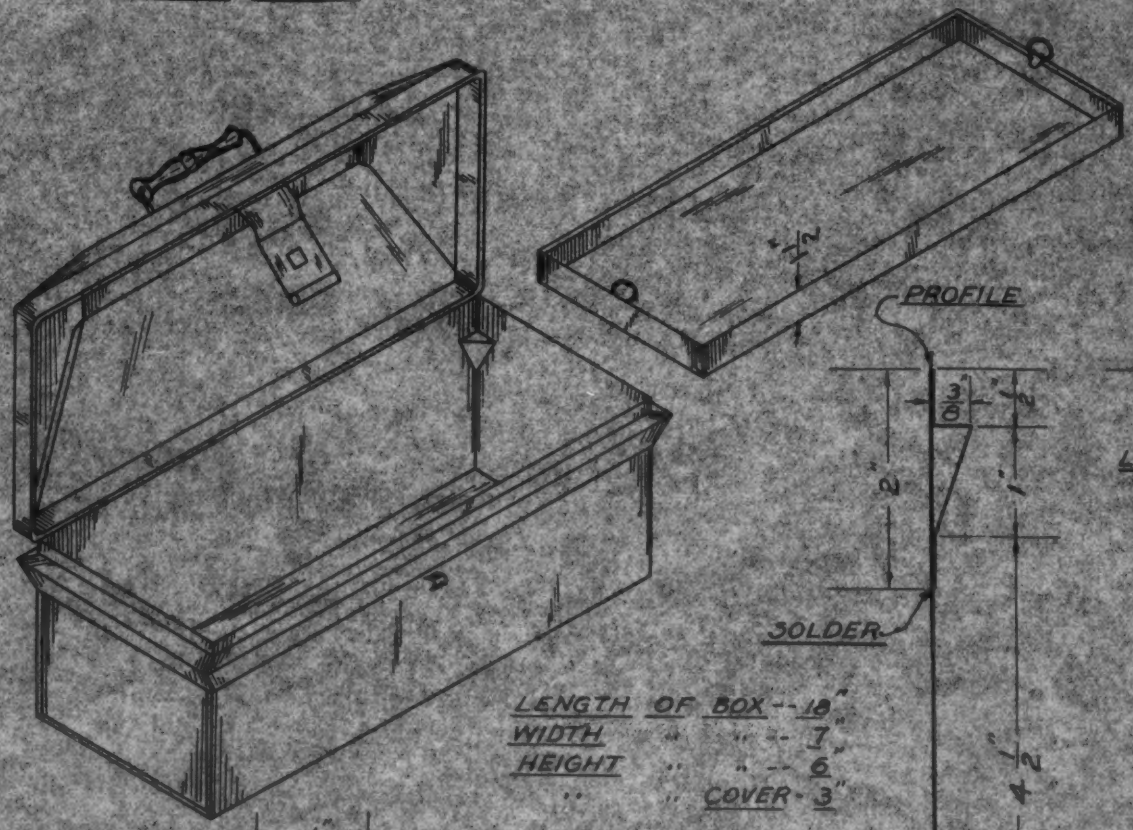
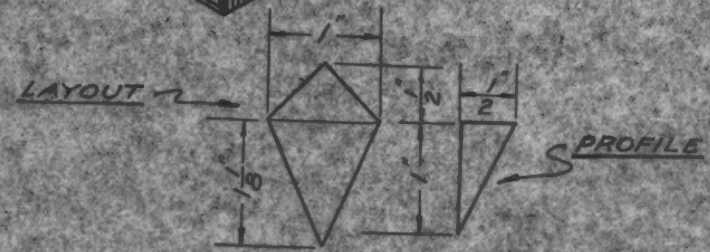
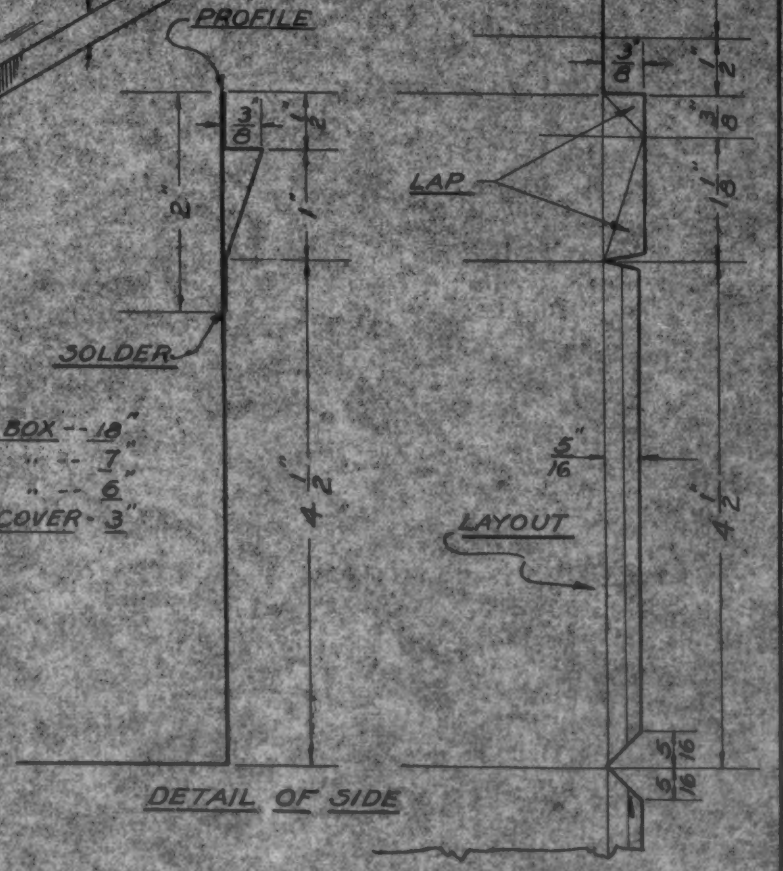
TOOL BOX





STOPS FOR TRAY



DETAIL OF SIDE

LENGTH OF BOX -- 18"
WIDTH " " -- 7"
HEIGHT " " -- 6"
" " COVER - 3"

Designed by Harry E. Anderson, Erie, Pa.

For Description See Page 345, Industrial-Arts Magazine, September, 1929.

TRACING SUPPLEMENT No. 148
THE INDUSTRIAL-ARTS MAGAZINE
SEPTEMBER, 1929

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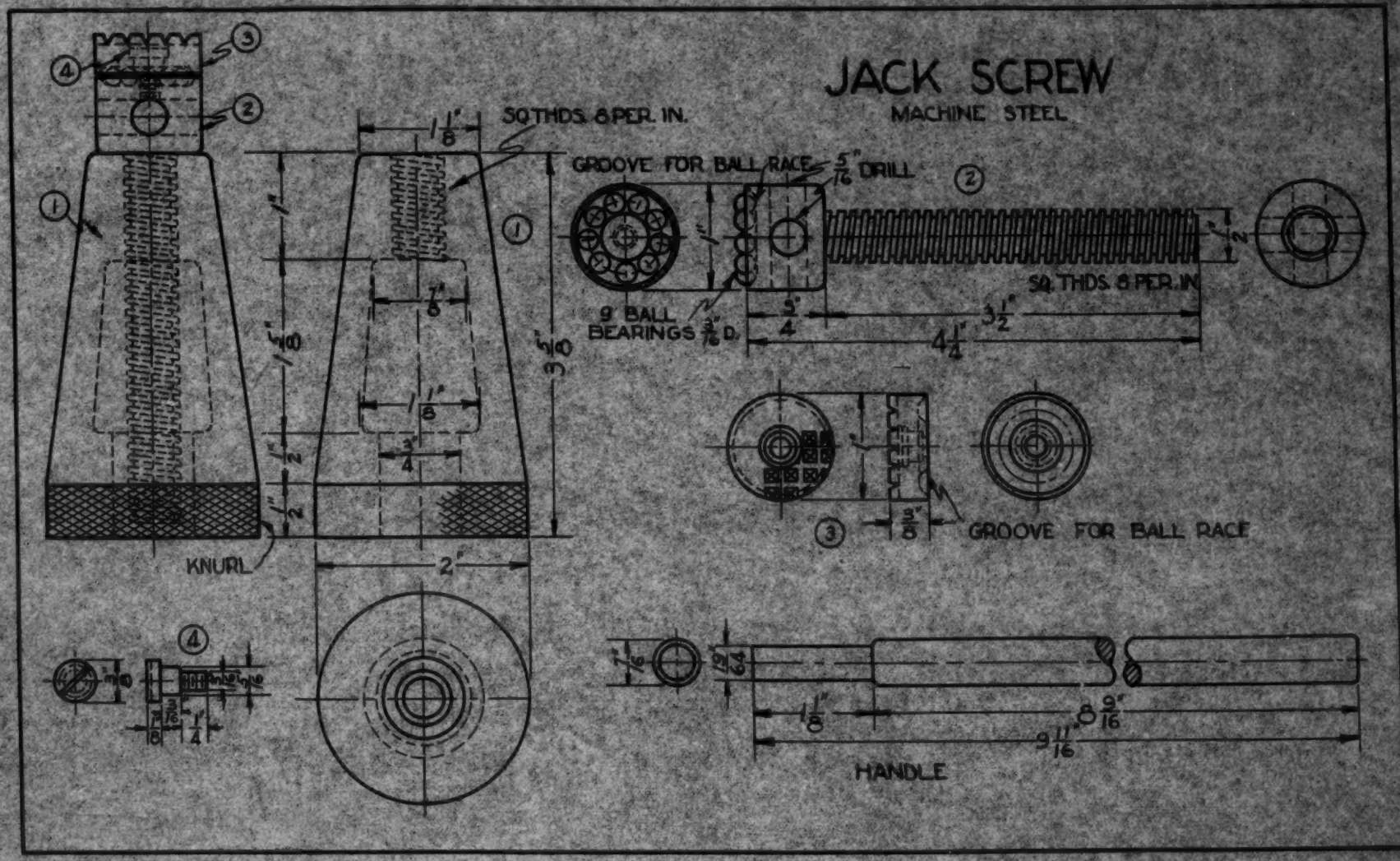
JACK SCREW

MACHINE STEEL



Designed by C. I. Linthicum, Centralia, Ill.

For Description See Page 345, Industrial-Arts Magazine, September, 1929.

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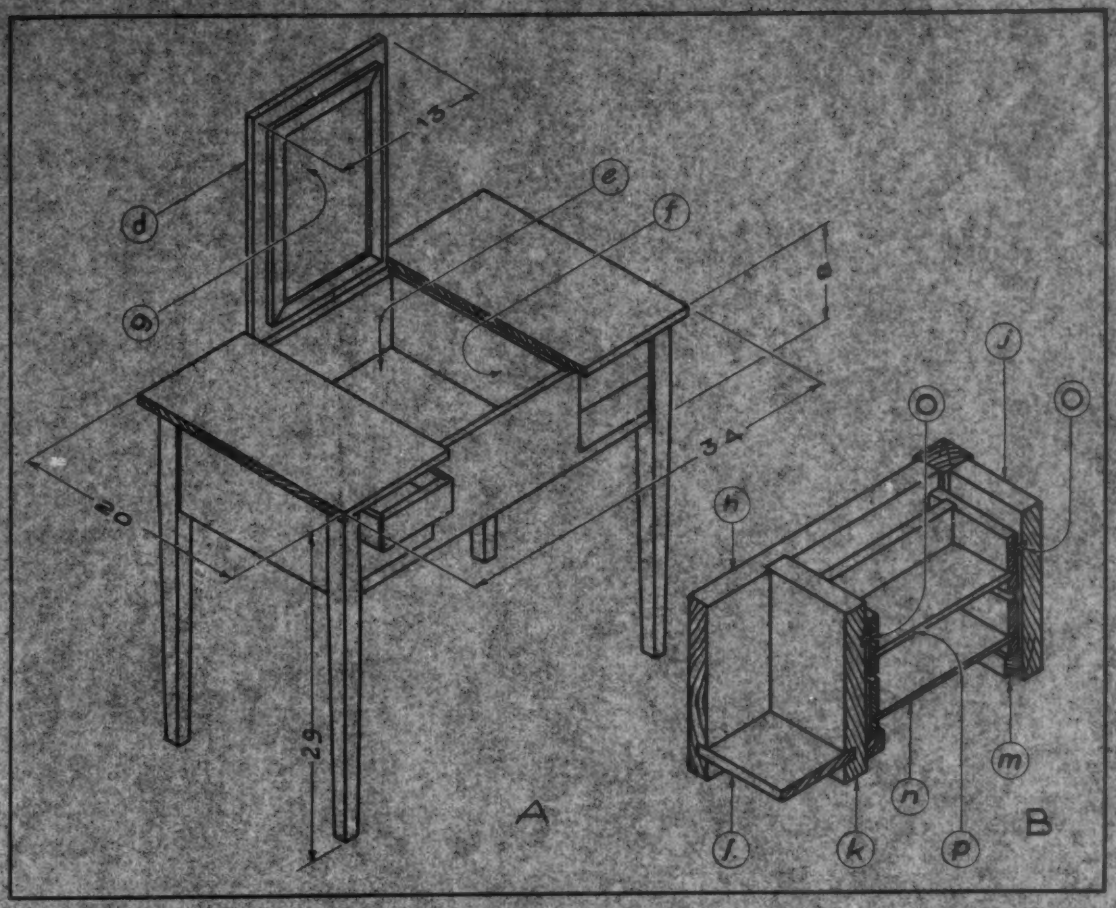

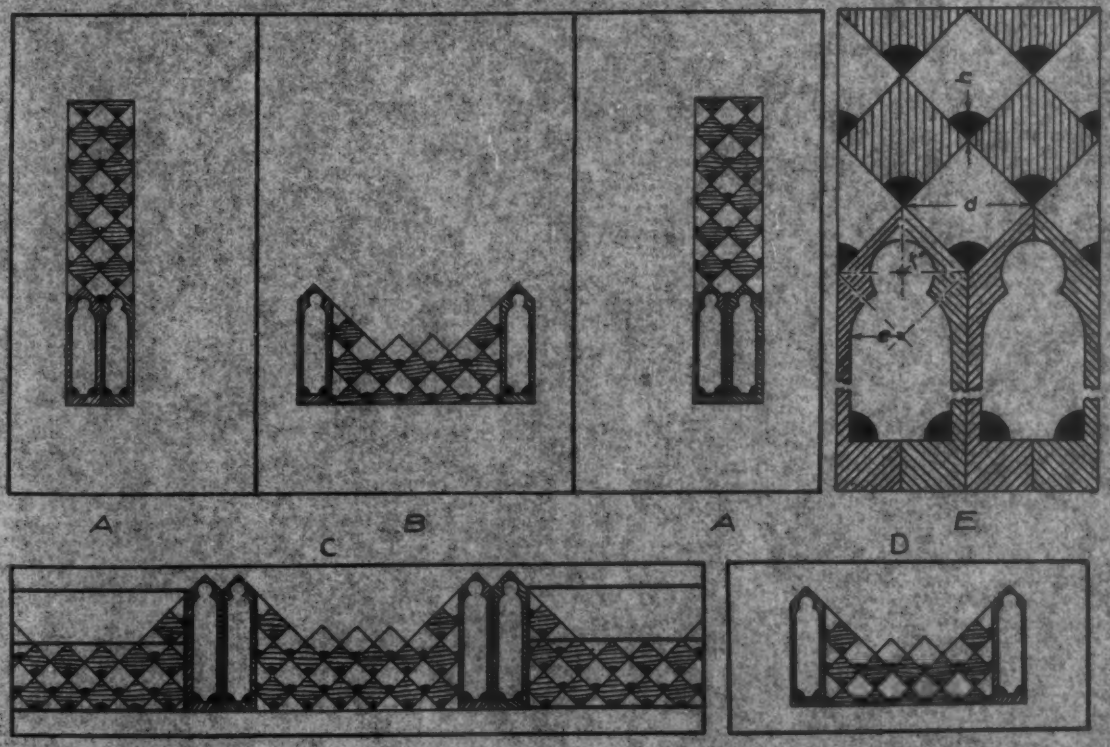

Powder Table, Designed by Margaret Fullerton.

For Description See Page 345, Industrial-Arts Magazine, September, 1929.

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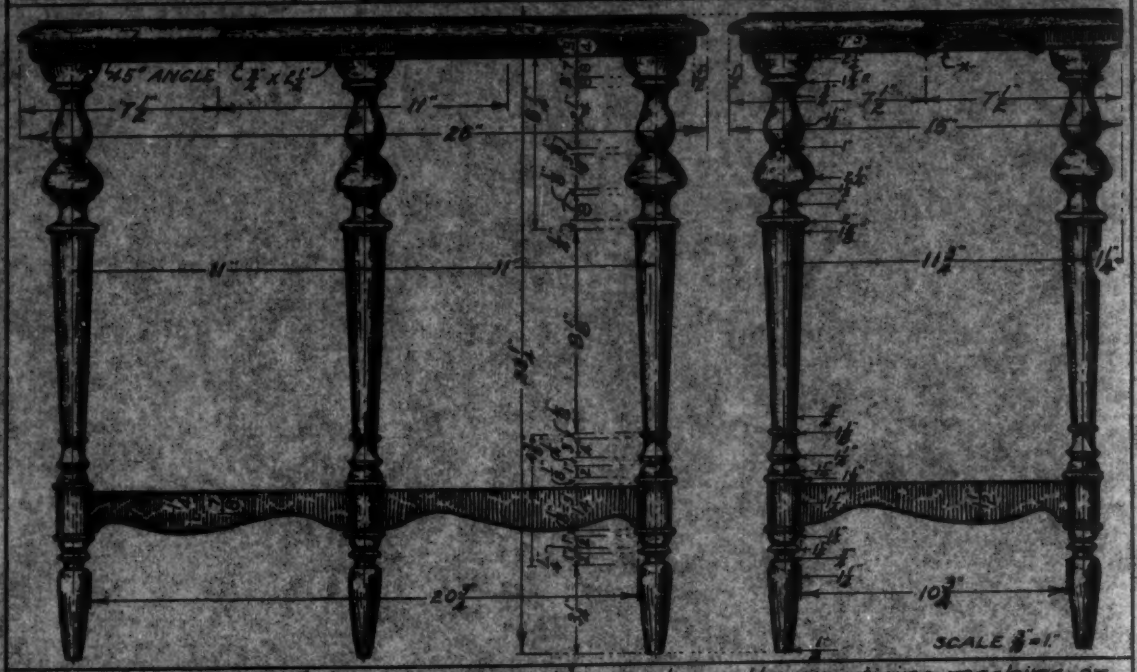
ADV. WOODWORK
CLIFFORD B. SMITH

END TABLE

PROJECT INSTRUCTION SHEET - A-101



THE PROJECT— A lacquer, walnut or mahogany finish is suggested for the End Table.

The following Unit Instruction Sheets will be needed for reference:- W-1, Squaring-up Process; W-100, Wood Turning; W-20, Curved Edges; W-120, Mortise & Tenon Joint; WT-37, Sandpaper; F-5, Staining; F-1, Shellac.

MATERIALS— Mahogany, walnut, gum or whitewood, 1½"-10 F.H. screws, ½"-10 R.H. Blued screws, hot glue, stain, shellac, pumice and rotten stone, washers.

TOOLS— Circular and band saws, mortising machine, jack plane, try and steel squares, marking gage, block plane, brace, auger bit, drills, hand drill, countersink, screwdriver bit, lathe (speed), lathe tools, "1 and "00 paper, bar clamps, ½" inside bevel gouge, spokeshave, cross-cut hand saw.

DIRECTIONS— 1- Make out bill of material on your working drawing.

2- Saw out the stock in rough. See 2,A100.

3- Center legs, rough down stock, turn to shape. See W-100. Sand with "1 and "0 paper.

4- Obtain face side and face edge of the lower rails. W-1. Band saw just outside the curved outlines. Work to curved lines. See W-20. Gage and plane to thickness. Saw to length in miter box.

5- Layout mortise on legs. See the illustration at -A-. The mortise, ⅜"x1½", can be cut out on a piece of paper and then traced on the leg. The mortises may be made on the mortising machine or cut by hand, see W-120.

6- Cut tenons on lower rails. See W-120.

7- Cut upper rails and bore holes to receive tenons on top of legs.

8- Carefully sand legs and rails.

9- Adjust bar clamps, warm wood, test hot glue. If all is in readiness, glue and test for wind and squareness.

10- Glue up stock for the top. Use dowel joint. See W-112. Alternate heart sides.

11- Surface plane top, square-up to size, see W-1. Cut to special shape.

12- The moulding around the edges, except the back, can be made by taking a ½"x½" saw cut on the circular saw. Then finish to shape with a block plane. Carefully sand.

13- Assemble top to base, using 1½"-10 R.H. Blued Screws. Place washers under the heads and allow for play by making the holes for the screws as shown at -B-. This applies only to the piece -X- supporting the middle leg. The rear piece fasten with 1½"-10 F.H. screws, countersunk.

14- Carefully check every part of the work for blemishes and apply finish. See F-5, F-1.

QUESTIONS— With the cross brace marked -X- above, why is it necessary to have the screw placed in a slot? The legs have round tenons on the upper ends. Would it be better to turn these to size before or after boring the holes in the braces? How are auger bits graduated in size, by 64ths, 32nds or 16ths? What size is a "4 auger bit? A "8 wood twist bit?

Designed by Clifford B. Smith, Buffalo, N. Y.

For samples of unit instruction sheets W-1 and W-120 see pages 359 and 360.

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

TOOL BOX

Harry E. Anderson, Erie, Pennsylvania

(See Supplement No. 147)

The tool box shown in Supplement No. 147, makes an interesting and useful project for the boy taking sheet-metal work in the trade school.

The layouts and profile for the sides and tray stops are given, and the other layouts should offer no exceptional difficulties to the trade student.

The box should be made of 26-gauge galvanized iron and finished with two coats of paint.

The operations are numerous, including laying out, forming, bending, folding, punching, cutting, notching, riveting, chiseling, filing, wire bending, and soldering. This makes it a good all-around shop project.

JACKSCREW AND HANDLE

C. I. Linthicum, Centralia Township High School, Centralia, Illinois

(See Supplement No. 148)

Small-size lathe projects which need a large number of different operations as tests of skill, are much in demand in schools having machine-shop equipment.

The jackscrew shown herewith is such a problem. It is inexpensive, and has proved to be a very popular job.

The operations which follow, are suggestive:

1. Cut the stock to rough size.
2. Straight-turn the base and head of the body to size.
3. Taper-turn the body to size and knurl the case.
4. Bore and tap the body to receive the threaded spindle of the lifting head.
5. Countersink the top of the body for spindle-head clearance.
6. Turn the lifting head to size, and cut the thread.
7. Drill the holes for the handle in the lifting head.
8. Turn the ball race of the lifting-head spindle.
9. Hand cut or mill the studded head of the lifting head, and cut the ball race on the lower face.
10. Drill and counterbore for cap screw.
11. Turn and thread the cap screw.
12. Turn the handle.
13. Caseharden and mottle.
14. Insert the bearings and assemble the lifting head.

A SPANISH POWDER TABLE

Margaret Fullerton

(See Supplement No. 149)

The structural design for this little dressing table, or "powder table" as it is quaintly called, was suggested by a Spanish antique. Although the original was used in a century when furniture was much different from ours, this piece is well adapted to our present-day requirements of beauty, utility, and conservation of space. It is very desirable as an individual piece in a room, harmonizing with, yet not necessarily matching the other pieces.

When the top is opened to form the dressing-table mirror, it discloses a compartment (Fig. 1, *e*) where all the toilet articles are placed ready for immediate use. Not only is this arrangement handy, but much safer for powder boxes and perfume bottles which sometimes tip over when slid back and forth in a drawer. Lowering the top protects all these, and gives the table a neat appearance which most dressing tables might envy.

The side drawers may be used for handkerchiefs and other accessories.

The inlay design is different from that on the museum piece. Arches and alternate blocks are characteristic of Moorish mosaics and Spanish architectural structure. This arrangement of them was adapted from the structure of "La Giralda," the bell tower of the Cathedral at Sevilla, Spain, built by the Moors in 1568.

The inlay requires three kinds of wood. This table was made of Peruvian brown mahogany and inlaid with satinwood for the light squares, American black walnut for the dark squares, and ebony for the small wedges. If one wishes to make the table in light-colored wood, it would be well to use Prima Vera as the background, and inlay this with tindalo for the light squares, narra for the darker squares, and rosewood for the wedges.

The construction of the table is shown in Figure 1, A and B, and requires no comment except to explain that the middle section of the top (which is raised in the drawing) is fastened to the top edge of the back rail by means of cedar-chest hinges.

The table was finished inside and out with three coats of Valspar varnish, rubbed to the dull eggshell finish.

Explanation of Drawings

Figure 1, A. View of powder table with middle section of top raised.
- *d*, middle section of table (hinged to back rail)
- *e*, powder box
- *f*, middle rail
- *g*, mirror

Figure 1, B. Part of one corner of the table showing drawer runners and powder box.
- *h*, back rail of table
- *j*, end rail
- *k*, middle rail
- *l*, bottom of powder box
- *m*, runner for lower drawer
- *n*, lower drawer
- *o*, runners for upper drawer
- *p*, upper drawer

Figure 2. Inlay Design.
- A, pattern for end section of top
- B, pattern for middle section of top
- C, pattern for front of table
- D, pattern for end of table
- E, details of inlay

d=1⅜ in. *f*=⅜ in.
e=½ in. *h*=¼ in.

A JUNIOR-HIGH-SCHOOL WOODWORKING TEST

C. Anthony Van Kammen, Grand Rapids, Michigan

Generally speaking, tests are given at the end of each quarter and at the end of the semester. The purpose, of course, is to find out what the members of the class have retained as workable knowledge. To be of real value all such tests should be given early enough so that they may be marked and recorded, and then returned to the class for corrections and discussions. Why not a practical test at the beginning of the semester to discover what amount of workable knowledge each member has when he enters your class? After two long months of summer vacation, much may have been forgotten

about tools, processes, and methods, even by members of your previous class who are continuing to work with you. With the opening of the new term in September, it may be possible that many boys entering your classes have not had woodwork for several semesters. Having the above thought in mind, a practical test for the new junior-high woodworker was developed.

It is not intended that a test of this nature be completed in one class period. Even the entire first week of the semester, or several lessons may be used. Though practical in nature, covering the use of a goodly variety of tools, it proves whether the necessary informational knowledge regarding tools is available for use. For boring certain holes, one must choose the proper kind of tool, such as an auger or a gimlet bit. Before one can bore the right size hole, the information relative to how bits are numbered for size must be known. Without the trial-and-error method no hole of a given depth can be bored unless one knows about a bit gauge and its use. Since the examination is in the form of a job sheet, the new boy must know how to read and follow printed instructions.

The working drawing accompanying the test has several dimensions missing. These must be supplied. In part of the work the boy must get all of his information from the working drawing before he can proceed further. Suggestive questions are included to make the worker think. The test not only informs the teacher of what the boy knows and is capable of doing, but it also shows the boy his lack of knowledge regarding tools and their use and makes him feel the need of that knowledge and ability.

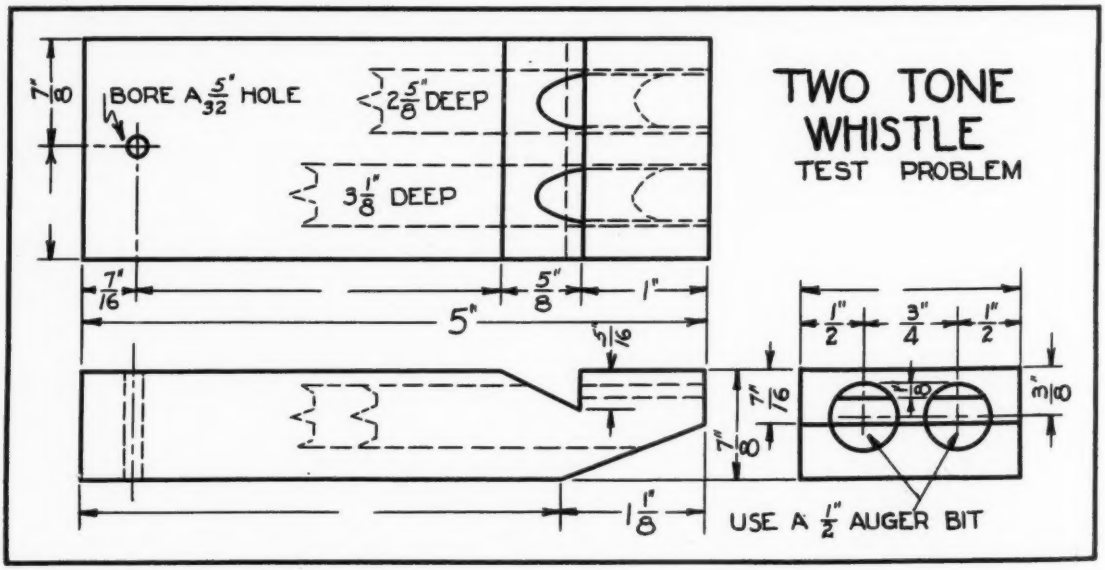
There will be no lack of interest in the desire to take or complete the test, for the problem chosen is one that no live-wire boy would fail to appreciate. It is suggested that a finished whistle be shown to the class before the examination is started, and that the class be given an opportunity to hear the clear harmonious two-toned notes. The working drawing and the test follows:

Stock Bill

No. Pc.	*Stock*	*Rough Size*	*Finished Size*
1	Basswood	10½ x 2 x 4/4 in.	10 x 1¾ x ⅞ in.
2	½-in. Basswood dowel	2¼ in. long	1 in. long

NOTE: Check each item as the work is completed.

1. Put in the necessary dimensions where missing on the working drawing.
2. Bring stock to finished dimensions.
3. Lay stock in front of you marked face up, marked edge toward you.
4. Lay off a point 5 in. to the right of the left end. How far is this point from the right end?
5. Through this point, square a knife line around the stock.
6. With the stock marked face up and marked edge toward you, starting from the left end, finger gauge on the marked face a line 4 in. long, and ¼ in. from the unmarked edge.
7. In the same way, ¼ in. from the unmarked edge, finger gauge a line extending 4 inches to the right, starting from the knife line.
8. On the same face, ⅜ inch from the unmarked edge and parallel with the first two lines drawn, finger gauge two more lines 4 inches long, one on the left half of the stock and the other on the right half. How great a space is there between the first lines drawn and the last lines just made?
9. Print the following information between the two lines made on the left half of the stock: "No. 1," your name and your grade.
10. Between the two lines on the right of the knife line print "No. 2," and your name and grade.
11. Place a bench hook in your vise and hold the stock against the bench hook with the marked face up and the marked edge toward you.
12. Cut the stock in two, sawing just to the right of the knife line which you made in the center of the piece of wood. What saw do you use?
13. Set the No. 2 piece away and use the other piece as follows:
14. Place the piece on the bench with the marked face up and the marked edge toward you.
15. With the stock in this position, mark on the marked face in the lower right-hand corner "R," meaning right end.
16. With the stock in the same position on the marked face in the lower left-hand corner mark "L," meaning left end.
17. Set the marking gauge to ⅜ inch. From what surfaces should one always gauge?
18. With the marking gauge as set, gauge a line across the right end parallel with the marked face. Is the gauge a pushing or a pulling tool?
19. Set the marking gauge to ½ inch.
20. With the marking gauge as set, gauge a line across the first gauge line on the right end. The intersection of the two gauge lines is the location for the center of the first hole to be bored.
21. Set the marking gauge to 1¼ inch, and gauge a line on the right end to locate the center for the second hole. Why not set the marking gauge to ½ inch?
22. Place the piece of stock on end in the vise so that about 2½ inches extends above the bench with the marked edge toward you and with the marked face to the left. It is important that the piece is in an absolutely perpendicular position ready for boring the holes.
23. From the toolroom get a ½-inch auger bit, a brace, and a bit gauge.
24. Assemble the tools just obtained ready for use so that the bit will bore a hole exactly 3⅛ inch deep. Should one measure from the end of the spur, the point, or from the lip?



25. Starting the point on the intersection of the nearest two gauge marks, bore the first hole. Try to keep the bit in line with or parallel to the marked face and marked edge.

26. Reset the bit gauge to bore a hole 2⅝ inches deep.

27. Starting the point on the intersection of the second two gauge lines, bore the second hole.

28. Return the bit gauge, brace, and ½-inch auger bit to the toolroom.

29. Remove the stock from the vise and proceed with No. 30.

30. Locate the centers on both faces of the stock for the 5/32-inch hole near the left end. (See working drawing.) List the tools in the order used.

31. Obtain a brace and the proper bit from the toolroom and bore the 5/32-inch hole as required.

32. Remove the piece from the vise and place on the bench before you with the marked face up and the marked edge toward you.

33. With a knife and a rule, lay off a point 1 inch to the left of the right end.

34. Square a knife line through this point across the marked face.

35. Continue the knife line only 5/16 inch on the marked edge and unmarked edge.

36. With a very sharp pencil, lay off a point 1⅝ inch to the left of the right end. How far is this point from the knife-squared line just made?

37. With a sharp pencil, square a pencil line across the marked face through this point. Why was a pencil used for the last two operations? (See working drawing.)

38. From the toolroom get a tee bevel and set to such an angle that a knife line may be drawn from the end of the pencil line drawn on the marked face to the end of the 5/16-inch knife line drawn on the marked edge.

39. With a knife and the tee bevel as set, draw slanting lines connecting the ends of the pencil line on the marked face with the ends of the 5/16-inch knife lines drawn on the edges.

40. Insert into each hole a piece of ½-inch dowel rod 2¼-inch long so that only ½ inch projects beyond the end of the whistle stock.

41. Place the work on the bench with the marked face down and with the marked edge away from you.

42. About 5/16 inch from the doweled end of the stock, drive a ¾-inch brad into each dowel to hold it in place. Do not drive the brads way in, as they must be withdrawn later.

43. Place the stock in a horizontal position in the vise with the marked face up and the marked edge away from you and so that the pencil line drawn across the stock will be ¼ inch beyond the edge of the bench.

44. With the backsaw, cut just to the right of the knife line which was drawn on the marked face, so that the saw kerf will be just ¼ inch deep. Do not cut deeper.

45. With a 1-inch chisel, pare out the wedge-shaped stock from the pencil line to the saw kerf, just down to the slanting knife lines.

NOTE: All tool operations which we wish to test have been completed with paragraph 45. You may continue making the whistle until the problem is completed if you desire.

46. Withdraw the ¾-inch brads which hold the dowels in place and remove the pieces of dowel rod.

47. From each piece of ½-inch dowel rod just removed, cut a piece 1 inch long.

48. With a smooth plane held sole up and set for a very fine cut, draw each 1-inch piece of dowel rod across the cutter until ⅛ inch has been planed off forming a flat side. (See working drawing.)

49. Slide the pieces of dowel rod just planed into the holes in the end of the stock, with the flat side parallel with the marked face.

50. Test the tone of the whistle to see if it blows easily and clearly. It may be necessary to remove the piece of dowel rod and plane off a little more stock as done in paragraph 48.

51. Spread a little glue in the holes, being careful not to get any on the section which is to be open.

52. Spread a little glue on the round parts of the 1-inch dowel pieces.

53. Insert the pieces of dowel in the holes with the flat side parallel with the marked face and allow the glue to set.

54. Gauge a line lightly across the right end 7/16 in. from the marked face. Why lightly?

55. With the stock on the bench, marked face down and marked edge away from you, set off, on the unmarked face, a point 1⅛ inch to the left of the right end.

56. With a sharp pencil and a try-square, square a line across the unmarked face through this point.

57. Get a tee bevel from the toolroom and set it at such an angle that a knife line may be drawn from the ends of the pencil line just drawn on the unmarked face, to the end of the gauge line made on the right end.

58. With a knife, draw the slanting line on each edge of the piece from the ends of the pencil line to the ends of the gauge line.

59. Place the stock in the vise with the marked face down and the marked edge toward you so that the pencil line is just beyond the left end of the bench.

60. With a wide chisel pare off the wedge-shaped stock from the pencil line to the gauge line on the end, down to the knife lines on the sides.

61. Finish the whistle in two colors of lacquer. Color the opening in the top of the whistle and the slanting under part of the mouthpiece first and allow to dry a few minutes.

62. Color the body of the whistle in a harmonious hue, either a compliment of the first color used, or a darker value of the same color.

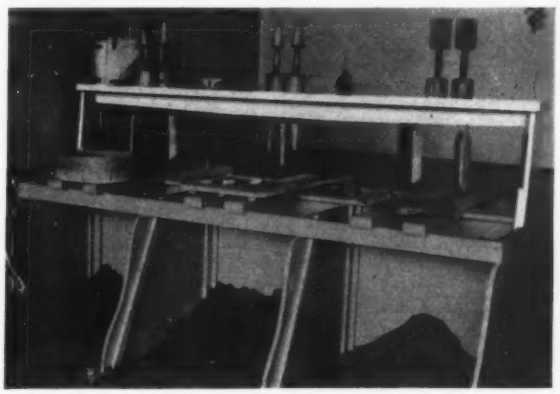
63. String a cord through the 5/32-inch hole in the left end of the whistle if you care to tie it to your belt, or loop it around your neck so that it will not get lost.

THE JUNIOR-HIGH-SCHOOL FOUNDRY

C. Al. True, Thomas Jefferson Junior High School, Cleveland, Ohio

Introducing foundry practice into the junior-high-school general metal course, places the instructor under the necessity of planning and rearranging his equipment to facilitate the practical handling of this type of work. Of course, these changes should be made without detracting from the general appearance or layout of his shop.

When we were confronted with this problem at the Thomas Jefferson High School, we set about to develop, design, and construct a type of molder's bench that would fit into our present scheme of equipment arrangement. The necessary water and fireproofing precautions were taken by covering the floor with four 30 by 96-in. sheets of 22-gauge galvanized sheet iron. These were laid with interlocking seams along the long edges of the metal, and nailed to the floor with copper nails.



MOLDER'S BENCH

To prevent the untidiness resulting from having the sand scattered on the floor of the room, a ledge-strip ⅞ by 2 in. was placed around the edges of this metal floor covering.

The stall and bin type of molder's bench which we adopted, provides each boy worker with his own sand bin, bench, and tools. He is held accountable for the care of the facilities and equipment to which he is assigned. The bench is shown in the accompanying illustration. It accommodates six boys, three on each side. This arrangement may be enlarged upon, of course, to meet additional or more extensive requirements.

With our system of rotating pupils in the various activities of the general metal shop, this bench has been found adequate and very serviceable.

HASSOCK OR UPHOLSTERED STOOL

Leslie H. Murphy, Princeton, Kansas

An upholstered stool is very handy in the home. It serves as a footstool, it can be used as a seat by the fireplace, or it may be used in many other ways. It serves well as a gift for Christmas, or as a birthday present. As a shop project it serves three purposes. First, it teaches the boy tool processes, second, it teaches him spring upholstering, and third, it is a good project for the teaching of a rubbed finish.

The most suitable material for the stool is walnut. Walnut works easily and takes a fine finish. In Figure 1, you will note

the construction. The size of the stool is 16½ by 22½ in. and it is 12 in. high. You will note that the legs are tapered ¼ in., starting from the bottom of the rails. The taper is only on the inside of the legs. The rails are set in, making a ¼ in.-ledge. You will note in Figure 1, that there is a notch cut in at the top of the leg so that there is a place to tack the upholstering. The notch is 1 by ¼ in.. The joints can either be mortise and tenon, or dowel. If machinery is available, the mortise and tenon is the best joint. I find that a properly constructed dowel joint holds as well as a mortise and tenon made by hand. A dowel joint can be constructed in one third the time it takes to make the mortise and tenon. After the joints are constructed, glue the stool together.

The next thing is the upholstering. The first step is to put on the webbing as in Figure 2. To do this, fold the webbing under and tack it at one end. Then, with the webbing stretcher make it as tight as possible. Continue this process until the webbing is all on. (Note the weave of the webbing in Fig. 2.) The next step is putting on the springs. The springs used are 6-in. pillow springs. The springs are tacked to the webbing in four places each, with stitching twine. The arrangement of the springs, on the webbing is shown in Figure 3. The next step is tying down the springs. This is shown in Figure 3, and is done with spring twine. After the springs are tied, tack a piece of burlap over them. Place 2½ lb. of moss on the burlap. This should be put on evenly so that there are no low places. Next stretch a piece of burlap over the moss and tack it in place with 4-oz. tacks. Then place a thin layer of cotton over the burlap, and over this stretch a piece of muslin, and tack it into place. It is advisable to put the finish on at this time so as to keep the varnish off the cover.

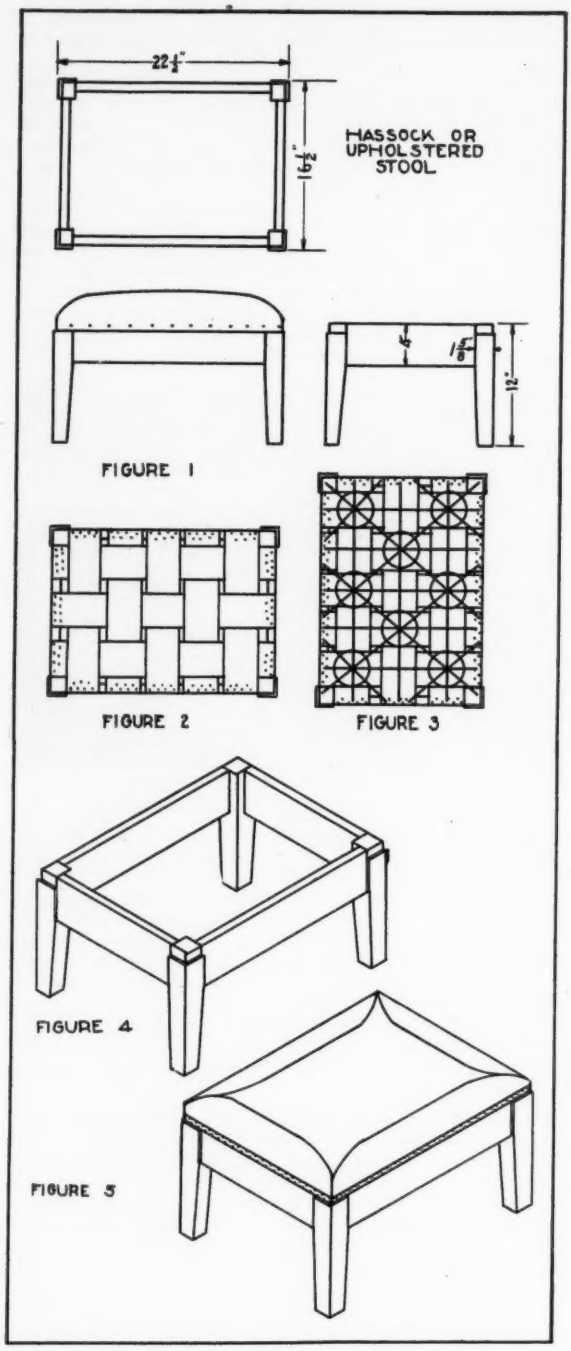


FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

FIGURE 5

The stool should be well sanded. If there are dents or marred places, they can be raised by putting a little water on the spot, and allowing it to stand until dry. It may take more than one application to raise the grain. After the stool is well sanded, stain the light places with walnut water stain. Next, fill the pores with dark wood filler. After the filler has dried, apply two coats of rubbing varnish. The last coat should be rubbed with pumice stone and water.

The cover should either be tapestry or velour. The size of the cover is 22 by 27 in. It should be stretched lightly and tacked into place with 2½-oz. tacks. To make the stool look finished, tack a piece of gimp around the stool as shown in Figure 4, and hide the webbing by tacking a piece of black denim over the bottom.

MOTOR WINDING AS A MANUAL-ARTS PROJECT

A. W. Dragoo, Illinois State Normal University

There are few projects so full of interest for boys as the electric motor. This wonderful something which we call electricity, seemingly coming from nowhere, yet capable of accomplishing such tremendous tasks, grips the mind and attention of man in a manner which few natural phenomena have been able to do. Let us look into it, solve its mysteries, see why and how it works for us.

Is motor winding too difficult for the high-school boy? Is the fact that not all boys will be able to comprehend just why a motor runs, sufficient reason for excluding from our plans this most interesting of electrical appliances?

Many will be willing to testify that the motor is not too difficult, even though we may not be able to bring every boy to a clear understanding of its working. It is possible to teach boys to wind motors with perfect success and to teach them the principle of its working mechanism with a somewhat lesser degree of success.

Probably no boy who builds a radio set knows more than even a small fraction of the reasons for its operation, yet we know that there is a high degree of success as judged by actual results. Is radio worth while? It is. Is the motor too difficult to handle? It is not if the instructor does not insist on teaching too many of the highly mathematical relations possible to explore. These relations had best be left for the physics classes or the engineering school.

The winding data which follows has been used with success on several types of small motors. The motor used in the electrical classes in the Illinois State Normal University is manufactured by the Loomis Electric Company, Chicago, Ill. The motor frame is suitable for either ¼- or ⅛-h.p. windings. If data is desired for the ¼-h.p. motor, it may be had from, "Small Motors—Transformers—Electromagnets," by Stoller-Austin-Seeger, Publishers, from whose book most of the data for this study has been taken.

Following the winding of the motor a series of tests are made including speed, direction of rotation, temperature rise, power factor, and horse power. Students greatly enjoy making these tests and considerable technical knowledge is gained through such experience. These tests are carried out by the student through the use of test sheets stating clearly and definitely just what is to be done. Standard tables are used giving the student opportunity to compare the results of his own work with commercially built motors.

Any teacher who can get an ordinary washing-machine motor of the 110-volt 60-cycle, a.c. type, can rewind it in a satis-

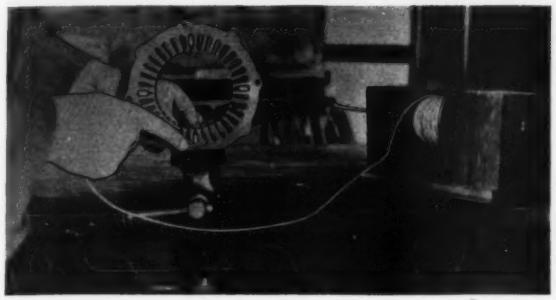


FIG. 1

factory manner by following the general directions here given. We know, of course, that for highest efficiency many other things must be taken into consideration besides those given. However, this data fits very well the characteristics of the average motor.

Winding a 110-Volt, 60-Cycle, Single-Phase Induction Motor

Information

The induction motor is one of the simplest motors using alternating current. It consists of two main members—a primary member through which the current is lead, and a secondary member which usually consists of a drumlike structure on which are assembled copper bars or rods secured at the ends by means of copper rings. Because the second member often has the appearance of a squirrel cage, it is called a squirrel-cage rotor. This second member may be either the rotor or the stator.

We shall consider a motor having a rotor of the squirrel-cage type and a stator which is wound to form a split-phase motor.

The rotor consists of a shaft on which are assembled the rotor drum as mentioned above, and a centrifugal cut-out switch. Some motors have a fan mounted on this shaft for more efficient cooling. The cut-out consists of a pair of wings held in a closed position by means of springs. When the rotor gains speed enough, the centrifugal force acting on the wings causes them to spread, thus releasing the contact disk. The starting winding, being connected through the cut-out switch, will be cut out of the circuit only when the motor has gained considerable speed.

The stator consists of a number of pieces of sheet iron punched like a cogwheel with the teeth on the inside. (See Fig. 1.) These teeth and slots vary in number, but in our motor we find 36. The slots are to receive the two sets of windings necessary in this type of motor.

There are two sets of windings in an induction split-phase motor—a main or running winding, and a starting winding. This starting winding is used only in starting the motor as indicated in the foregoing. After the rotor gains speed, the winding is cut out. It is with these two sets of windings that we are chiefly concerned, and about which more specific data will follow.

Mechanical Data: ⅛-h.p., 1,800 r.p.m.

Main winding, 1,008 conductors of No. 18 cotton covered enameled wire. (3 lb.)

Starting winding, 520 conductors of No. 23 cotton covered enameled wire.

Operations—Main Winding

Place the stator in a vise, being careful not to break the insulation surrounding the outside of the teeth. Fill each of the slots with a fiber insulator. This insulator consists of a piece of fiber folded to fit the slot and extending slightly beyond the slot edge.

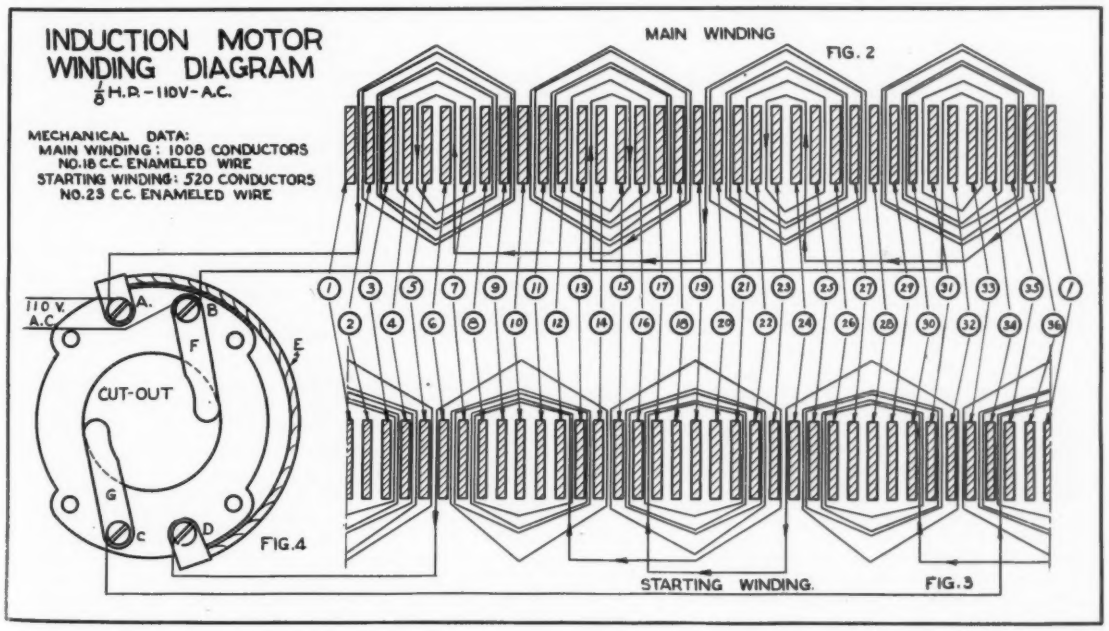
Place small blocks of wood in the slots between teeth 5–6, 14–15, 23–24, and 32–33. (See Fig. 1.) These indicate the centers of the four poles of the motor and hence, the center of the main windings.

Place the spool of No. 18 wire on some kind of rack so that the spool will be free to rotate as the wire is used. Begin the winding by passing the wire through slot 31–32, which means the slot between teeth 31 and 32. (See Fig. 2.) Return the wire through slot 33–34. Continue this winding until 21 turns have been placed. When the 21 turns have been placed in slots 31–32 and 33–34, slot wedges should be placed in the top of the slot to prevent the wire from coming out. It must be remembered that a second winding is to occupy a part of these slots, hence the necessity for having the winding lie securely in the bottom of the slot. Use great care in all winding to see that the insulation is not broken, otherwise short circuits will surely result, necessitating rewinding.

The winding now progresses in a spiral, taking in slot 30–31 and back through 34–35. Continue the winding in these slots until 21 turns have been put on. Place the slot wedges as before.

Refer now to Figure 2. Note that in the slots, thus far used, only one line is shown in the drawing. This line represents a certain number which we shall designate K^1. In this case, $K^1=21$. It is evident, therefore, that in all slots in which one line is shown there will be 21 conductors, and in all slots in which two lines are shown there will be 2×21, or 42.

The winding now passes spirally to 29–30 and back through 35–36. Continue the process until 42 turns have been placed.



Place slot wedges and proceed spirally to slot 28–29 returning through slot 36–1. Place 42 turns and wedge as before.

The winding thus far has been in a clockwise direction, four slots containing 21 conductors each, and four slots containing 42 conductors each. We therefore have 252 turns placed, forming one-fourth of the main winding. This winding forms the first pole of the motor. When this pole is positive, the adjacent poles must be negative and the only means of securing this condition is to wind the adjacent poles in the opposite direction. This gives us the reason then, for carrying the wire from slot 36–1 to 24–25 and back through 22–23. By referring to the diagram in Figure 2, it will be clear that the two pole windings are wound in opposite directions, thus giving opposite polarity.

This second pole is wound exactly as the first except for the direction, as indicated. In winding pole three, reverse the direction of winding as before. Likewise reverse direction for pole four.

Before proceeding further, the coils already wound should be taped. Using ½-in. cotton tape, wrap each coil outside of the slots. See that the coils are bent back and shaped to clear the rotor. If coils have been evenly and carefully laid, no trouble will be experienced in finding room for all the windings.

Starting Windings

Examine Figure 3, and note that this winding is very similar to the main winding. Some of the windings lie in the same slots with the main windings. Let us trace the windings of one of these poles. The poles, you will note, lie exactly in the center of the main winding poles. Slot 32–33 being the center of the first pole of the main winding, is seen to be the dividing line between pole one and two of the starting winding.

In this winding we let our factor $K^2=13$. Therefore in all slots having starting winding coils, we shall have 2×13, or 26 turns.

Begin the winding by passing the wire through slot 34–35 clockwise back through 3–4. Proceed until 26 turns have been placed. Pass spirally to 33–34 and back through 4–5. Pass spirally to 32–33 and lay in only 13 turns. The reason for this is that slots 33–34 and 5–6 must contain a portion of the windings for pole two and pole four. It can be seen that when the winding is finished each slot containing any starting winding will have 26 turns.

One fourth of the starting winding has now been placed as follows:

Slots	*Conductors*	
34–35	26	
3–4	26	
33–34	26	
4–5	26	
32–33	13	(windings of this pole)
5–6	13	
Total conductors	130	

The four poles of the starting winding will therefore have a grand total of 520 conductors as required for the ⅛-h.p. motor.

Proceed with the winding for pole two, winding in the opposite direction so that we may have opposite polarity. All poles of this winding are exactly alike except for direction of the winding. After winding each of the four poles, carefully tie each of the coils with narrow cotton tape or cord. See that the coils are pressed well back to clear the rotor.

The winding is now complete and ready for testing.

Connecting up the Motor

It is assumed that the rotor parts have been assembled and the shaft oiled ready for mounting in the frame. It will be found that one part of the cut-out switch is mounted on the frame. This part consists of a piece of insulating material to which is attached two copper contacts, together with four binding screws. Refer to Figure 4, and note binding screws A, B, C, and D. Observe that binding screws A and D are connected together by means of a connecting wire E.

Connect the 110-volt, 60-cycle, a.c. wires to screws A and B. To these same screws connect the two ends of the main winding. It will be seen that the main winding will be in circuit at all times.

Connect the starting winding to the remaining screws C and D, then screw D is connected to the main line by means of the wire E. Screw B has contact with a copper strip F. Copper strip G has contact with screw C. Since F and G have no connection, this forms an open circuit in the starting winding.

Place the head of the frame over the shaft after having placed the stator in the frame. Notice that as the head is brought up to place, the small round disk on the cut-out makes contact with both F and G, thus closing the starting winding circuit.

Place head screws securely and see that all projecting wires are clear of the rotor. Turn the rotor a few turns by hand to make sure that all is clear. Plug into the 110-volt current, and the motor should start. As the rotor picks up speed the cut-out disconnects the starting winding and the motor continues to run on the main winding only. When the current is turned off and the rotor speed diminishes, a sharp click will be heard indicating that the cut-out has again connected the starting winding in circuit ready for starting the motor again when wanted.

If the motor starts easily and the cut-out switch functions properly, remove the head of the motor frame and prepare permanent connections.

Short pieces of stranded fixture cord should be soldered to all leads and securely taped in place. Leave only enough to reach to the binding screws. Surplus cord is in danger of striking the rotor and damaging the motor.

Baking

Remove the core from the motor frame and cover completely with baking varnish. Place in the oven and bake from 1 to 2 hours at a temperature of 250 deg. F. The length of time required for baking will depend somewhat upon the quality of baking varnish used.

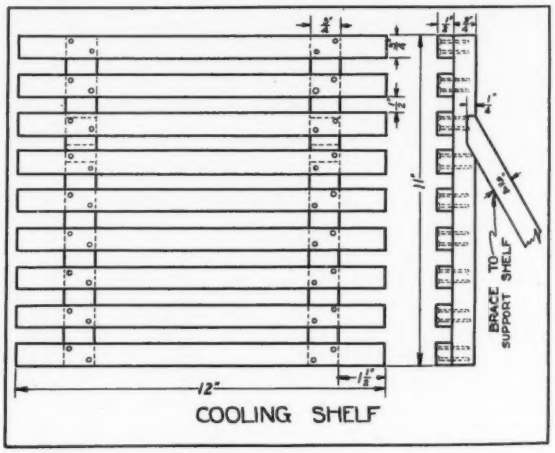
After baking the core, replace in the motor frame and make the proper connections.

COOLING SHELF

C. M. Jochem, Jr., Pompton Lakes, New Jersey

As the weather grows cold and we look for the homemade pies and puddings, we should find this project quite seasonable.

The shelf may be made from strips found in the scrap box. It is to be fastened flush with the window sill, and the brackets are to extend down to the side of the house for support.



This job has been found very satisfactory with fifth graders. It involves many of the principles and operations of elementary woodworking and supplies the home with a very useful article.

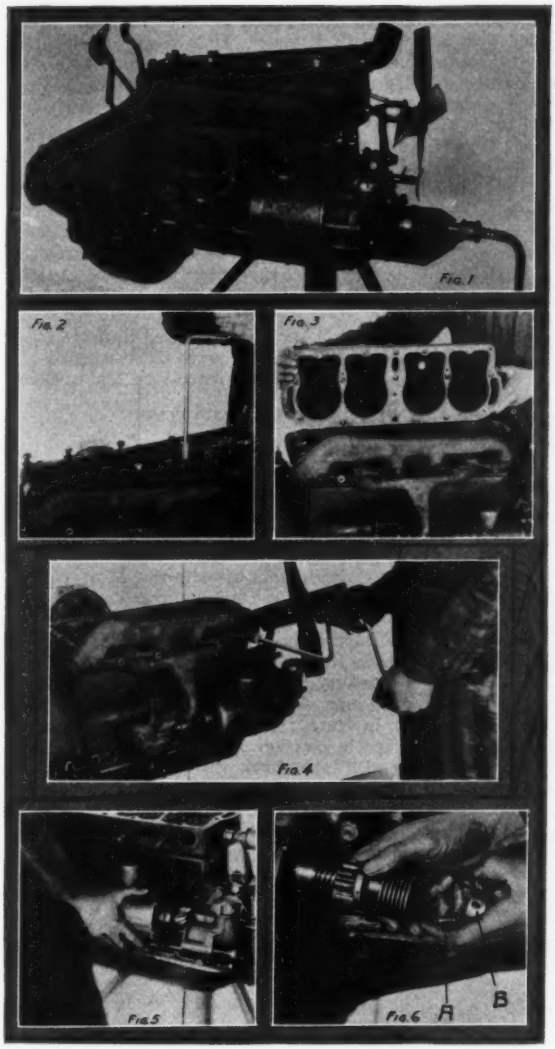
TYPICAL JOB SHEET FOR THE AUTO SHOP

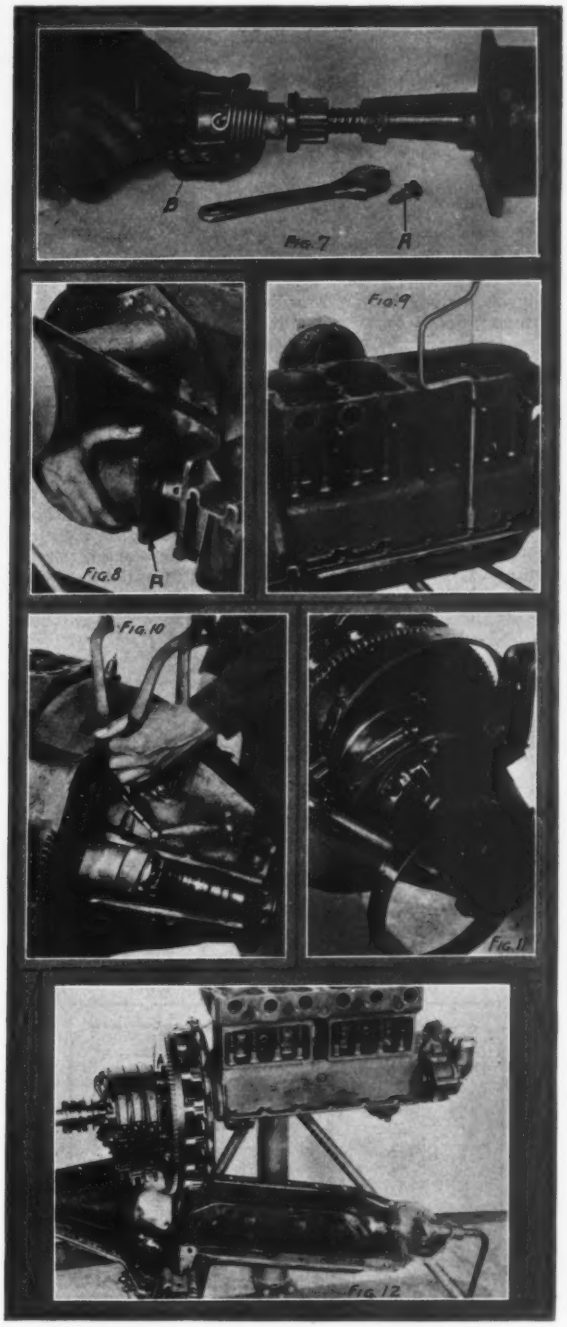
Ray F. Kuns, Cincinnati, Ohio

Disassembling Ford Model T Power Plant

The operation outlined here covers the complete disassembling of the component parts of the Ford Model T engine. If the engine is mounted on a stand, similar to that illustrated in Figure 1, it will be possible to do all of the repair operations without removing the block from the stand, except in case the block is to be rebabbitted or the cylinders reconditioned.

There are a number of speed wrenches especially designed to take care of the rebuilding operations on the Ford motor. These may be purchased direct from any authorized Ford





service station, or from any of the jobbers dealing in automotive-repair equipment. It is a good plan to have these special tools for the training of the apprentice. The disassembling operation is accomplished as illustrated and described in the following:

1. Use a socket wrench or the Ford spark-plug wrench to remove the spark plugs and lay them aside.

2. Use the speed wrench to run out the cylinder-head bolts. These may be left in the cylinder head and removed with the head to the bench. (See Fig. 2.)

3. Remove the cylinder head and cylinder-head gasket, as shown in Figure 3. When the head is at the bench, the bolts may be lifted out and placed in a container.

4. Use a speed wrench to run off the four nuts holding the manifold clamps and manifolds. (See Fig. 4.) Remove the exhaust manifold and intake manifold with carburetor assembled.

5. Remove the four studs used to hold the manifold in position, to prevent them breaking off. A stud remover or a 10-in. combination pliers will serve for this.

6. Remove the commutator-case spring bolt and the two generator-mounting bolts. (See Fig. 5.) Lift off the commutator cover, remove the commutator brush and remove the generator, as shown.

7. Remove the cap covering the Bendix drive. Four screws hold this in place.

8. Pry up the extension on the Bendix-head spring-screw lock washer and removing this screw marked A in Figure 6, remove Bendix head B by slipping it off over the end of the starting-motor shaft. If this head sticks, it may be removed by means of a Bendix-head puller as illustrated at B in Figure 7, lifting the Bendix key from the starting-motor shaft. Tap it with a light hammer and punch if it sticks tight. The Bendix-shaft gear and spring can now be slipped off by hand.

Note: It is permissible to allow the starting motor to remain on the transmission cover if no work is to be done on the starting motor.

9. Remove the four screws holding the starting motor to the transmission cover and lift off the starting motor, as shown in Figure 8.

10. Remove the transmission door and loosen the transmission bands by running out the slow-speed adjusting-screw lock nut and the adjusting screw. Use wrenches, as suggested in Figure 9, to remove the cap screws holding the crankcase to the transmission cover and cylinder block.

11. Lift off the transmission cover, as shown in Figure 10.

12. Transmission bands may be removed as shown in Figure 11, or allowed to remain in position. The ball cap, which supports the rear of the transmission shaft, should be removed at this time.

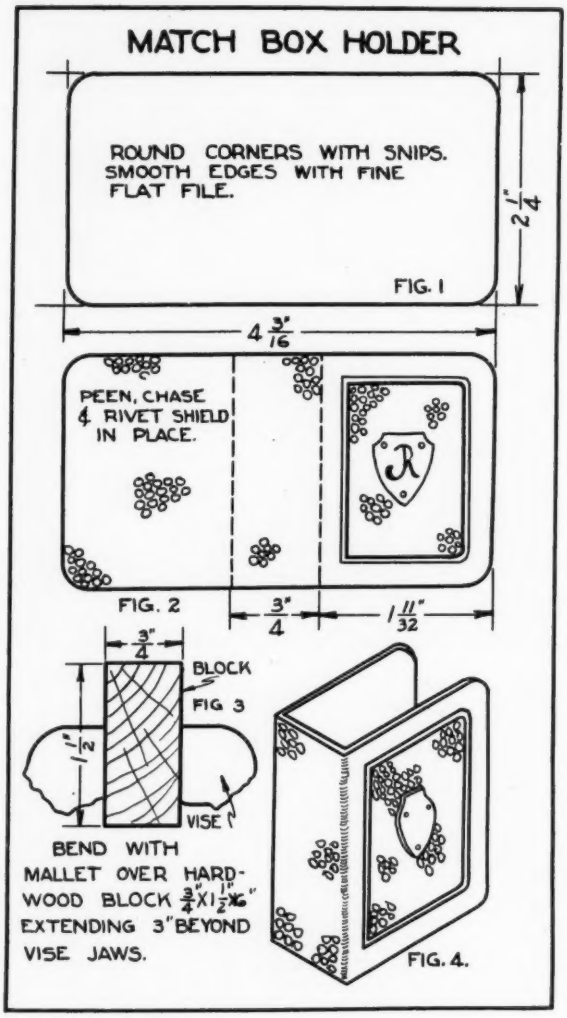
13. When all of the cap screws have been removed, the crankcase will be dropped down, as shown in Figure 12. This exposes the transmission, flywheel, crankshaft, main bearings, and connecting rods for work.

(To be concluded)

A MATCH-BOX HOLDER

Gerald A. Boate, Seattle, Washington

The match-box holder is made of a small piece of sheet aluminum, brass, or copper, about 18 gauge, which is cut as shown in Figure 1. Cut the corners round, then smooth the edges, using a smooth-cut flat file. When placing the aluminum in the vise, protect it by placing heavy paper between it and the vise jaws. Be sure that all corners are rounded evenly. Now paste on any design which may be chosen. Put in the two border creases with the proper punch, but do not pound too hard. Be sure the aluminum is held on a flat piece of metal so that the force of the hammer blows will act on the metal, and not on the bench top beneath. Small pieces of sheet brass or copper will be suitable for the initial shield. Make a pattern of the shield, and paste it on the brass. Use a sharp pointed prick-punch for outlining the monogram and also to locate the centers for the three rivet holes which are to be drilled with a hand drill and a No. 30 drill for the brass escutcheon pins which serve as rivets.



The second step is to lightly peen the sides and back of the holder with a machinist's hammer. Then rivet the shield in place, being careful that the holes in the aluminum match the holes in the shield. Snip the back points of the rivets off quite close and then flatten them out with light hammer blows. The rivet heads should face the outside.

The third step is to make a ¾ by 1½ by 6-in. hardwood block. This should be clamped firmly in the vise jaws so that 3 in. will extend beyond the jaws and toward you. It must be rigid as it forms a jig on which the flat sheet is to be bent to shape. Lay off the lines where the bends are to be made as shown in Figure 2. Then place the piece on the hardwood block, and bend the edges over carefully, striking lightly with a wooden mallet. Polish the holder with fine steel wool, and bend in the two front edges a little, and it is ready for a box of safety matches. Figure 4 shows the finished project.

The holder also may be etched, engraved, or lacquered if made of copper or brass, or it may be plated with gold or silver.

TOY ELECTRIC MOTOR

H. J. Johnson, Duluth, Minn.

As a project for the electric shop, the small motor seems to lead all others in popularity with the boys. Two difficulties usually present themselves: First, the difficulty of obtaining a suitable field without foundry facilities; and second, that of winding the coils with a reasonable amount of speed and at the same time securing a presentable appearance. Most electric shops are equipped for cutting and drilling iron, and these are the most difficult jobs involved in this project.

The motor here described may be quickly and easily made by the average boy in the school shop with no special help from the instructor, and its manufacture by the boy will result in a better understanding of electromagnetism and the principle of motors. For instance, the field coil with the bolt thrust through it and locked in position will make a very good bar electromagnet. The coil assembled with the two pole pieces will make a powerful "U" electromagnet. Separate connectors may be provided for the brushes, so that the motor may be quickly connected as a series motor, or as a shunt motor, and the lead wires reversed to reverse direction of rotation. This motor does not develop a large amount of power, but will run very satisfactorily on three to ten volts, either alternating or direct current.

Following is a list of all material needed:

No. 1. One baseboard ¾ by 2½ by 5 in.
No. 2. Two Fahnestock connectors
No. 3. One piece ⅛ in. iron pipe 1½ in. long
No. 4. Two pieces ⅜ in. sq. iron, 2 in. long
No. 5. One piece ⅜ in. sq. iron, 1⅜ in. long
No. 6. One 3/16 by 3 in. r.h. stove bolt
No. 7. Two pieces of copper 1 by ¾ by .007 in.
No. 8. One piece of paper 1½ by 3 in.
No. 9. Two fiber washers ⅞ in. in dia., ⅜-in. hole
No. 10. Two brass brushes ⅜ by 2½ in. (No. 30)
No. 11. One brass bearing 4½ by ⅜ by 1/16 in.
No. 12. Two feet ¾ in. cotton or friction tape
Eight No. 4 f.h.b. wood screws, ½ in. long
One 10d. common nail
Sixty feet No. 24 d.c.c. wire
Four No. 10 brass washers

Following are the steps to be followed in the construction of the motor:

1. Prepare the material as listed.

2. Wrap the paper tightly around the iron pipe and glue it in place.

3. Glue the fiber washers on the pipe about 1/16 in. from each end.

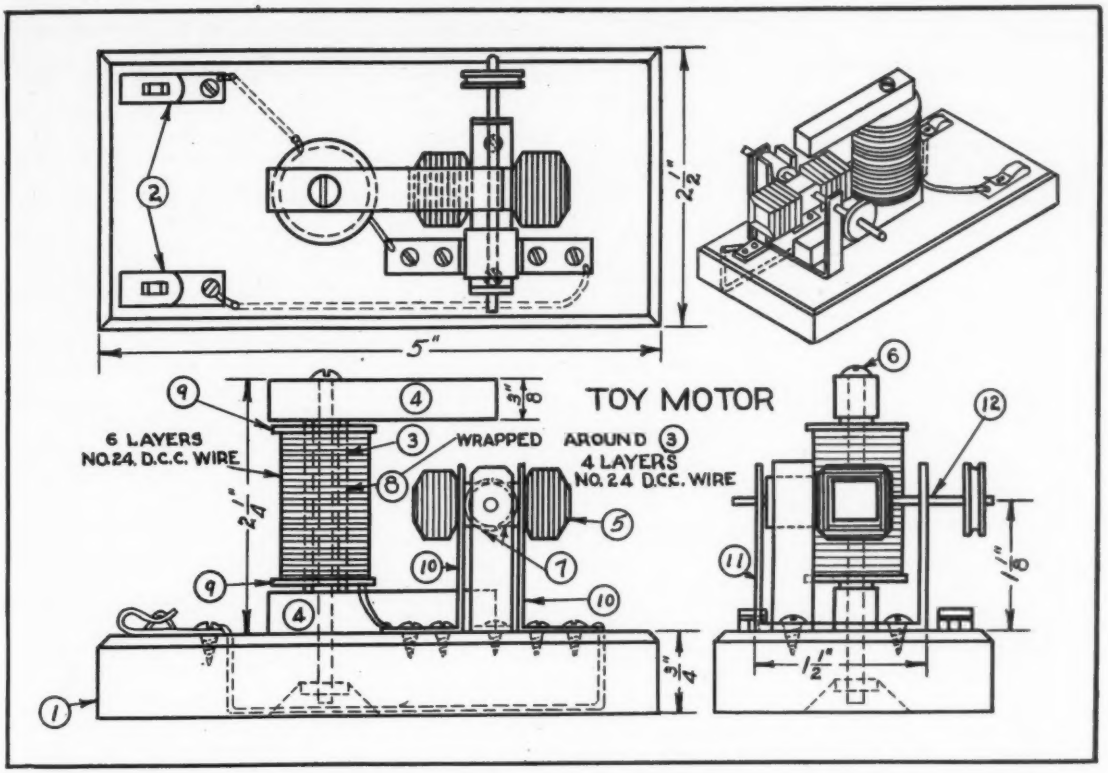
4. Slip this core over a winding jig, or pass the bolt through it and grip the projecting end of the bolt in the chuck of a hand drill.

5. Wind six smooth layers of wire, leaving about 8 in. at each end of the coil for making the connections. Shellac the coil.

6. Drill baseboard as indicated in the top view.

7. Countersink the bottom of the base to receive the nut of the bolt.

8. Drill the pole piece with a 3/16-in. hole, ½ in. from one end.



9. Using a hack saw and a file, mortise the bottom of one pole piece ¼ in. wide and 1/16 in. deep, for the bearing to pass through. (See illustration.)

10. Pass the bolt through the pole pieces and baseboard, and tighten the nut.

11. Drill a 9/64-in. hole through the center of the 1⅜-in. iron armature.

12. Drive the 10d. nail half way through the armature and cut off the head and the point.

13. Cover each end of the armature with a smooth layer of friction tape and wind on four layers of wire, leaving 3 in. at each end for connections. Shellac the coil.

14. Wrap 2 ft. of tape around the nail at one end keeping the layers tight and even at ends.

15. Shape the copper ribbon to fit around the tape, and divide in the center to form the commutator. Glue and bind with thread.

16. Solder the ends of coil to the copper, one end to each segment.

17. Drill the bearing strip at ¼ in. and 1¾ in. from each end, using a 9/64-in. drill.

18. Bend at right angles 1⅜ in. from each end.

19. Place the bearing in position and fasten it down with two screws.

20. Force the bearing open enough to insert the armature.

21. Drill the brushes ¼ in. and ¾ in. from one end, using a 9/64-in. drill.

22. Bend at right angles 1 in. from the drilled end.

23. Fasten the brushes down with two screws to each brush.

24. Fasten down the Fahnestock connectors, and make connections as shown.

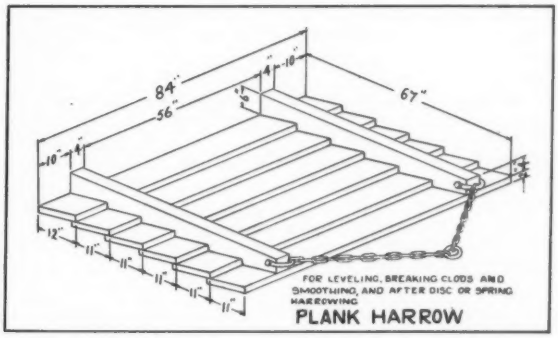
A PLANK HARROW

Chas. A. King, East Kingston, N. H.

This is an excellent project for a class in agricultural woodwork. The harrow is quite efficient for smoothing, leveling, and breaking surface clods, hence the project is well worth while.

It may be made of any hard wood, like oak, for example. If it is found to be too light for the work which is expected of it, rocks may be piled on it, or the driver may ride on it. By shifting his weight from one place to another, he will add much to its efficiency.

In making the harrow, 2 pieces 4 by 6 by 67 in., and 6 pieces 2 by 12 by 84 in. are required. The notches in the two 4 by 6-in. joists to receive the 2 by 12-in. plank, should be marked carefully and either cut by hand, or with a band saw. The latter method is to be preferred, for the resulting straight and true cut insures better nailing.



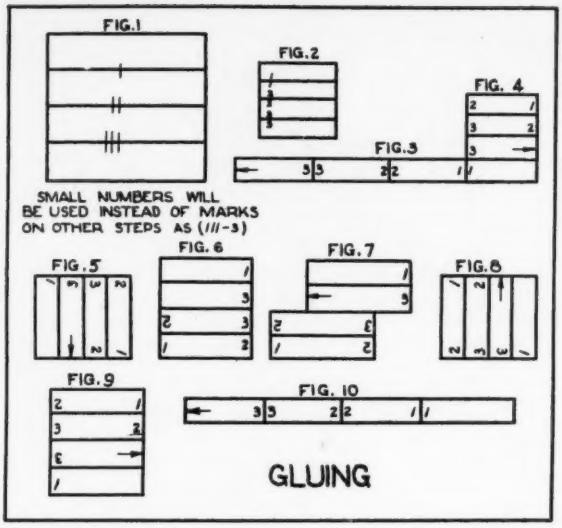
Bore a hole in the front end of each 4 by 6-in joist to receive a stout clevis bolt as shown. Beginning with the rear plank, nail each firmly in place, using four or five 30d spikes driven in on a slant in different directions, so as to insure the greatest possible resistance to the heavy racking strain to which the harrow will be subjected when in use. Secure a suitable chain or cable in which a middle link or ring is fitted and make each end fast in the clevis. A team of horses is required on this harrow, but a somewhat smaller one may be made for one horse.

JOB SHEET ON GLUING

R. B. Farr, South Junior High School, Everett, Wash.

Information

To prepare hot glue, break it into small pieces and soak until soft in enough cold water to cover it well. This will take about 12 hours. Put it in the glue pot and heat it. Heating glue over and over weakens it, so the fresher it is the better. When ready to use, it should be thin enough to drip from the brush in a thin stream so as to fill the pores of the wood. The less glue



between the two surfaces to be glued, the better, and the glue must be hot and the wood warm so that the glue may remain in liquid form until the surfaces are forced together. Glue holds best in side grain. End grains may be made to hold by sizing with the thin glue to stop the pores. Pieces thus sized may be glued in the ordinary way but such joints are seldom good.

Before applying the glue to the parts to be glued together, it is a good plan to fasten them together temporarily without glue to see that all parts fit. Hot glue sets quickly and it is essential to get the parts together as quickly as possible after applying the glue. All appliances likely to be needed, such as clamps, paper to protect the blocks from sticking, blocks of wood, braces, mallet, try-square, should be in readiness before the gluing process is begun. The surplus glue may be wiped off with a warm damp rag. The rag should not contain enough water to wet the wood however. After the glue hardens, it also can be chipped off with an edge tool.

Object

To glue two or more pieces of lumber, edge to edge, without dowels.

Materials

Four or more pieces of lumber (any wood), 3 or 4 bar clamps, depending on length of boards, animal glue, mallet, and strips or blocks of wood to use as protectors from clamp marks.

Procedure

1. Have the pieces to be glued matched and jointed.
2. Have the clamps set to the right size and the pieces marked as shown in Figure 1. Small numbers will be used in the other figures shown in the illustration instead of the marks. For instance, the mark 111 will be replaced by the Figure 3, (see Fig. 2) but not over 150 deg. F.
4. Warm the pieces of lumber before gluing.
5. The pieces are to be placed on the glue bench as shown in Figure 3.

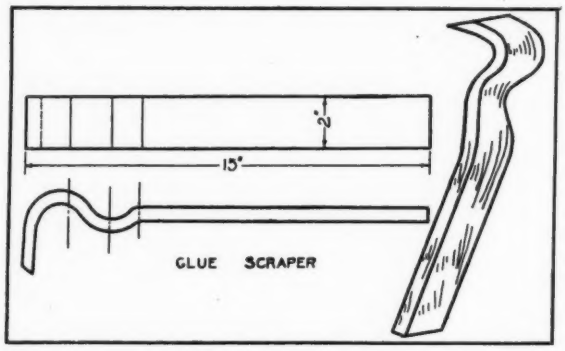


FIG. 11

6. The last piece, Figure 3, must then be reversed and the remaining pieces placed on top as in Figure 4.
7. The lumber must next be turned as shown in Figure 5, and again as in Figure 6.
8. Move the pieces to the edge of the table for gluing and push pieces 1 and 3 back as shown in Figure 7.
9. Apply the glue to the lower pieces on edges 2 and 1 as shown in Figure 7.
10. Turn the lumber as shown in Figure 8, and again as in Figure 9.
11. Glue edges 2, 3, 3, and 1.
12. Commencing with the pieces as shown in Figure 9, spread them out as in Figure 10, and put them between the jaws of the clamps.

Conclusion

1. Use speed in the gluing operations, as glue sets very fast.
2. Do not tighten clamps too tightly until all pieces are flush on the ends, and all are in proper place.
3. See that the face of the glued pieces are parallel to the edge of the clamp, and rest on the clamp bar.
4. Use a wooden mallet or hard-rubber mallet to drive boards in place. If neither of these are handy, a block of wood and an ordinary claw hammer may be used, but do not use the hammer alone.
5. Tighten all clamps equally.
6. Place the clamps on both sides of the work so as to equalize the pressure.
7. Let the work set overnight before removing the clamps.

Questions

(To be answered in class or in notebook.)

1. Why not use a hammer to drive pieces of lumber in place when gluing?
2. Why will edges hold better than ends when glued?
3. Why have clamps on both sides of the work?

Glue Scraper

The glue scraper shown in Figure 11 is made out of an old car spring. The spring used is ¼ in. thick, 2 in. wide, and 15 in. long. The curves shown in the drawing may be any length or shape and also the angle of the cutting edge may be shaped to the best advantage of the user.

This scraper is exceptionally good in a factory, and it is an equally good tool for the high-school shop.

METAL KITCHEN STOOL

J. W. Bollinger, Tulsa, Oklahoma

The boys who make this kitchen stool, invariably come back and say that mother is delighted with it. It is light and strong, and, when finished with white enamel, harmonizes well with the kitchen furnishings.

The legs are made of angle iron, ⅛ by ¾ by ¾ by 31 in. long. The bottom end is heated, laid over the nose of the anvil, and the two sides of the angle flattened and rounded to form the feet, as shown. The feet should be formed so that a wide area rests on the floor.

Place the legs on the bench with the feet resting against the wall, mark off 27¼ in. from the foot end, to the place where the upper bend is to be bent. This bend is made on the opposite side from the foot, and is bent over the rounded edge of the face of the anvil. This end must be flattened out so that it will fit up against the top. It is very important to make all four legs exactly the same length.

There are ten braces, made of ⅛ by ½-in. band iron. Two braces measure 8½ in., two 9 in., two 9½ in., two 10 in., and two 10½ in. A 3/16-in. hole is drilled at each end of each brace, ¼ in. from the end to the center of the hole.

The legs are drilled next. Mark off lines on both sides of the angle, spaced as shown in the drawing. Then hold the legs together in the position that they will occupy after they have been assembled, and mark off on which side of the angle where the hole is to be drilled. It will be observed that the holes in one pair of legs will be drilled one way, and those in the other pair the other way.

Assemble the legs and braces by riveting together the two sides which have three braces in them, then connect up these sides. Use 3/16 by ½-in. iron rivets. Be very sure to put the braces in their proper position.

The top should be made of some hard wood, preferably in the woodworking department. Drill three ¼-in. holes into the top of each leg, and fasten the top in place by means of 1-in. No. 10 r.h. wood screws. Place the top with the grain running

at an angle of 45 deg. with the tops of the legs for greater strength.

The entire stool is given four coats of white enamel. Between coats it is advisable to sand the stool with No. 00 sandpaper.

The newer kitchens are using more color, hence some students may want to enamel the stool some brighter color to match the rest of the kitchen furnishings.

VERTICAL FILE BOXES

D. E. Kellogg and W. A. De Vette, Erie, Pennsylvania

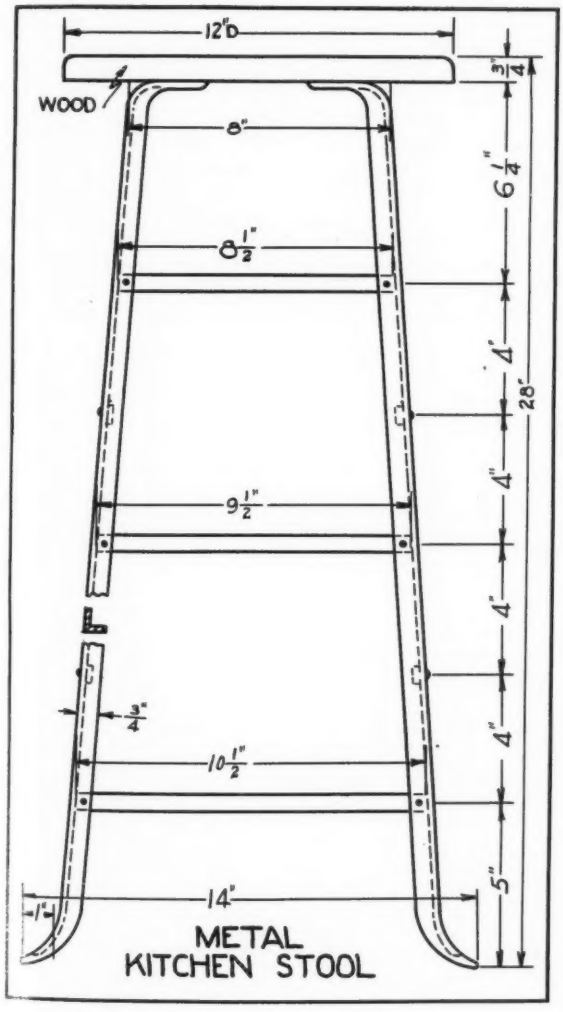
School shops, mechanical-drawing rooms, and music rooms frequently show the lack of suitable provisions for filing blue prints, drawing folders, or sheet music.

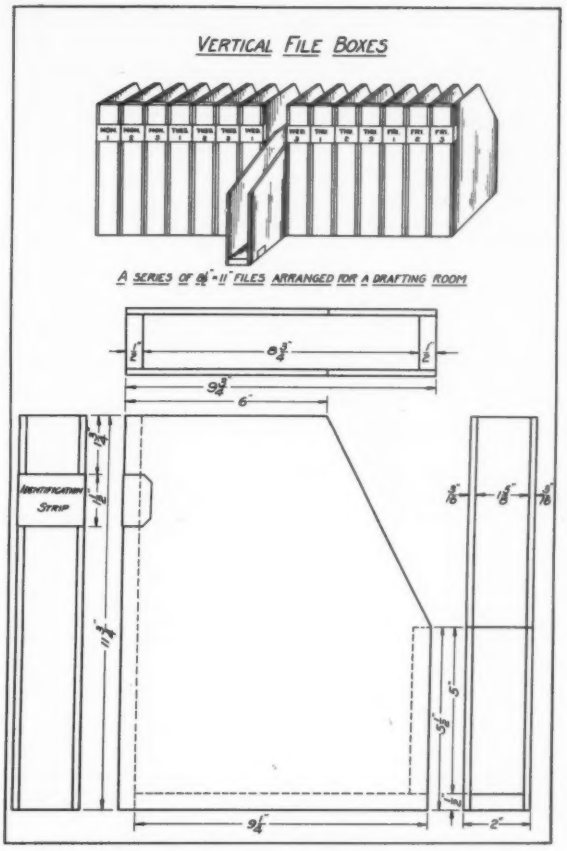
Inexpensive files for taking care of such materials may be made by utilizing the packing boxes which arrive at every school building, and which upon being unpacked are usually consigned to the boiler room.

The illustration shown herewith, shows a set of these file boxes made for use in the drafting room to hold work held over from one lesson to the next. One student in each class may be appointed to distribute and collect the material and place it in its proper place at every session.

The boxes illustrated are made for filing standard letter-size sheets, 8½ by 11 inches. These dimensions must necessarily be changed to suit individual needs.

The fronts, backs, and bottoms are made of ½-in. material, while the sides may be made of the three-play veneer usually found on packing cases. Wall board also may be used for the sides. The identification strip may be made either of paper or sheet metal.





GEAR PULLER

F. E. Just, State Teachers College, Oshkosh, Wis.

The problem of the instructor in machine-shop practice is to find or develop suitable projects. Projects that will interest the pupil, and, when completed, be of practical use in the home or shop. These projects should be simple but still retain good teaching material in the uses of the different machine tools employed and in the operations that are to be performed upon the project.

The materials used in making this project are carbon tool steel for the beam and legs, and cold-rolled steel for the screw and keys.

This project involves the uses of the following machine tools and the operations performed on each.

Beam

Lathe: chucking, facing, center drilling, and turning.
Drill press: Drilling (for tapping).
Bench: Tapping.
Milling machine: Cutting keyways.

Screw

Lathe: Chucking, facing, center drilling, turning, shouldering, thread cutting, and taper turning.
Bench: Laying out and filing head. The head, however, may be machined if desired.

Legs

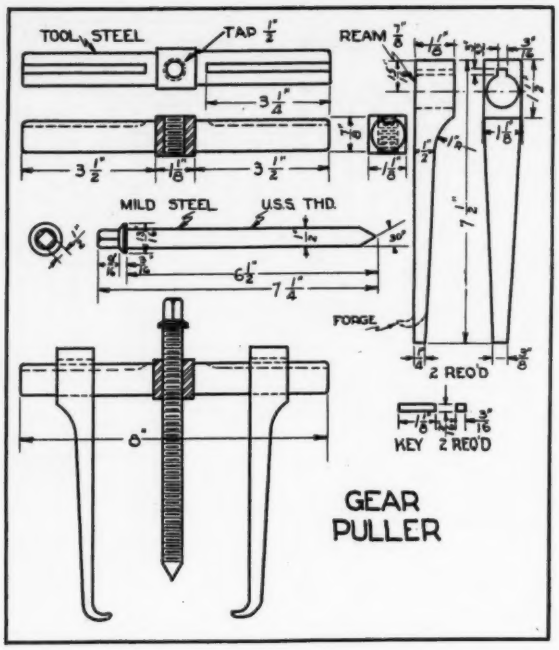
Milling machine: Milling backs of legs.
Shaper or Planer: Shaping sides of legs.
Drill Press: Drilling holes for beam, reaming.
Bench: Cutting keyways in legs, fitting keys.

Keyways also may be cut on the shaper, or a broach may be used.

Forge

Forge hooks on ends of legs harden and draw to a dark blue.

In making the beam, the ends are faced and center-drilled in the lathe, then roughly turned to size. The hole for the screw is drilled and tapped, care being taken to see that it is drilled and tapped straight. The beam should not be finish-turned until the holes in the legs are drilled and reamed. This



is done to insure a good fit in the holes of the legs. After the beam is completely turned, the keyways are milled.

The legs are first laid out and drilled for the beam, then the backs of the legs are milled. (A set of parallel bars having the proper taper to take care of the angles on the legs are very convenient.) The sides of the legs may be shaped, planed or milled. The holes in the legs are next reamed for the beam, the keyways cut in legs for the keys, and the hooks forged and tempered. The keys are fitted to the keyways in the legs tightly, so that they will not drop out or slide.

The screw is turned to the dimensions given on the drawing and the thread is cut on the lathe. The tapped hole in the beam may be used for a thread gauge, thereby insuring a good-fitting thread. The point on the screw is turned by placing it in a universal chuck and setting the compound of the lathe at an angle of 30 deg.

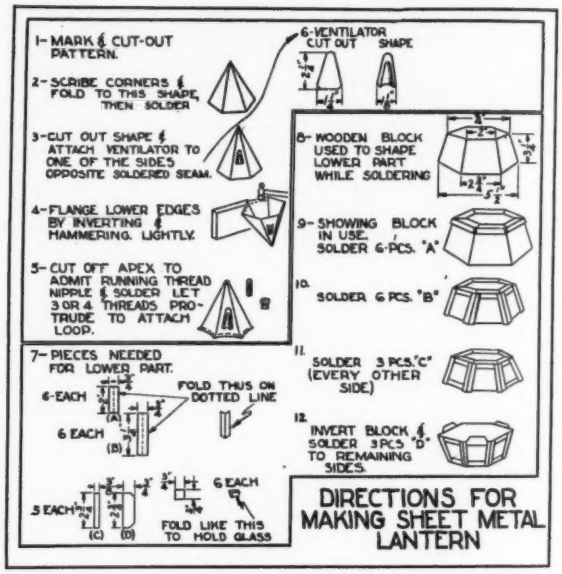
A SHEET-METAL LANTERN

C. Dudley Moore, Glen Ridge, N. J.

The lantern shown herewith has been used in our ninth-grade classes, and has also been made by some of the eighth-grade boys.

The chief features that recommend it are that it is made of IC tin, a very inexpensive material, and that it involves a number of operations in sheet-metal work, such as folding, cutting, use of scratch awl, soldering, accurate measuring, cutting glass, painting, electrical work, etc.

We start with the top, using a paper or cardboard development as a pattern. (See Fig. 1.) After cutting out, the edges are scribed and creased quite distinctly by pressing over the edge of a board, and then the remaining lap is soldered. The


1- MARK & CUT-OUT PATTERN.
2- SCRIBE CORNERS & FOLD TO THIS SHAPE, THEN SOLDER
3- CUT OUT SHAPE & ATTACH VENTILATOR TO ONE OF THE SIDES OPPOSITE SOLDERED SEAM.
4- FLANGE LOWER EDGES BY INVERTING & HAMMERING. LIGHTLY.
5- CUT OFF APEX TO ADMIT RUNNING THREAD NIPPLE & SOLDER LET 3 OR 4 THREADS PROTRUDE TO ATTACH LOOP.
6- VENTILATOR CUT OUT SHAPE
7- PIECES NEEDED FOR LOWER PART.
6 EACH
FOLD THUS ON DOTTED LINE
6 EACH
3 EACH
6 EACH
FOLD LIKE THIS TO HOLD GLASS
8- WOODEN BLOCK USED TO SHAPE LOWER PART WHILE SOLDERING
9- SHOWING BLOCK IN USE. SOLDER 6 PCS. "A"
10. SOLDER 6 PCS. "B"
11. SOLDER 3 PCS. "C" (EVERY OTHER SIDE)
12. INVERT BLOCK & SOLDER 3 PCS "D" TO REMAINING SIDES.
DIRECTIONS FOR MAKING SHEET METAL LANTERN

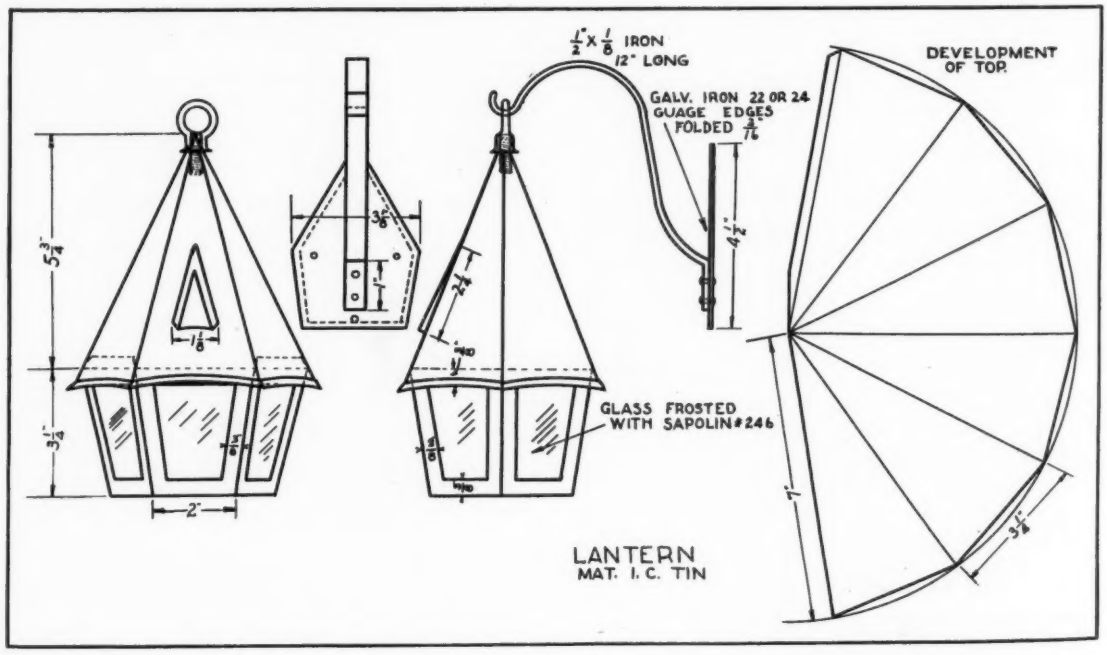

1/2" X 1/8 IRON 12" LONG
GALV. IRON 22 OR 24 GUAGE EDGES FOLDED 1/16
DEVELOPMENT OF TOP
GLASS FROSTED WITH SAPOLIN #246
LANTERN
MAT. I. C. TIN

FIG. 1

next step is to make the ventilator. This is cut out as an isosceles triangle, the corners trimmed, and then the rounded form is obtained by bending with the fingers. The piece is then inverted and the edge hammered flat all around the top and two sides to a distance of about 3/16 in. This piece is then soldered to the top on one of the sides opposite the lap joint. Then the lower edges of the top are flanged outward slightly, making a little offset from the straight slant height line. The apex is cut off and filed until it admits a piece of ⅛-in. running-thread nipple, which is soldered to the top, leaving about four threads protrude. Then a loop is screwed on to support the lantern when it is hung up. This loop and running-thread nipple can be obtained at the 5 and 10 or at any electrical supplies store.

The making of the support and bracket requires no especial explanation.

In making the lower part, it will be found much easier to make a wooden form the correct size so that the small pieces may be folded and soldered directly upon it. A drawing of this form and the method of using it are shown.

We found that a great deal of scrap tin may be used up for the small pieces required to build the lower part.

To fasten the top and lower part together, the pieces at the top of the glass are made in two widths, and three of each are used. The three wider pieces are to be soldered to the corresponding sides of the top, inside.

To hold the glass, pieces of tin ¾ in. square are cut, folded, and soldered at each joint, then bent over the edges of the glass.

A coat of black or dark-green duco or quick-drying lacquer is a good finish. Ordinary window glass is used and frosted with Sapolin No. 246. The lamp must then be wired. A porcelain or "pig-tail" socket is recommended if the lantern is to be used outdoors.

A GLUING TABLE

Fred W. Bergmann, Cramer Junior High School, Camden, New Jersey

For some time the writer has been trying various devices for holding clamps while gluing panels, table tops, etc. The table illustrated was designed to act as a rack for holding idle clamps and clamps in use.

The material used was 1⅛-in. poplar. All joints are blind mortise and tenon with ¼-in. relish on all sides except the top edge of the upper rail. These are ¾ in. The tenons on rails A and B are 1 in. long and glued into the mortises. All other tenons are ½ in. long and are held together with 2¼-in. No. 12 r.h.b. screws. To prevent the screws pulling out of the end grain, pieces of ½-in. birch doweling are inserted, so that about ⅜ in. of the screws is given a good hold in the cross grain. Each joint has two screws. Roundhead stove bolts may also be used, sinking the burr as is done in assembling workbenches. The upper screw in each top or notched piece should be about 1½ in. from the upper edge to prevent its splitting to the first notch.

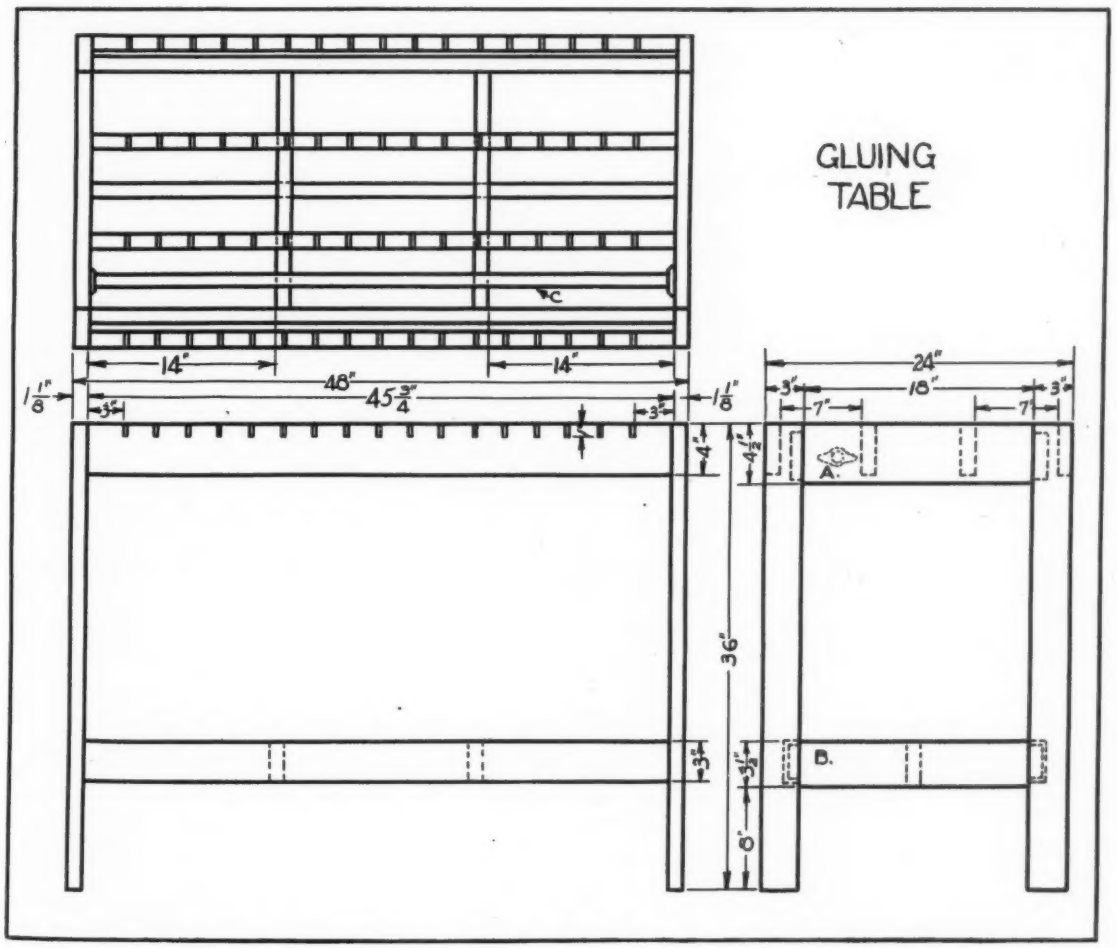
The four upper rails are clamped together and the notches cut as follows:

End notches 3 in. from each end; the others approximately 2½ in. on centers, 5/16 in. wide and 1 in. deep. The notches should be sawed and cleaned out while the boards are clamped to keep them in alignment.

A piece of band iron is fastened on the lower rack to protect the rails from the idle clamps stored there.

The 1-in. pipe C is used for storing short clamps. It is fastened in place with small flanges.

The upper rails are oiled to prevent glue from adhering to them. The rest of the table was given a light walnut finish to harmonize with the cabinets and trim up the shop.



ELECTRIC POP-CORN POPPER

R. B. Farr, South Junior High School, Everett, Wash.

This electrical pop-corn popper is very popular with the boys in the general shop.

The body can be made of either 26-gauge blue polished steel or 28 IC bright tin. The metal for the body is cut 4⅞ in. wide and 25⅜ in. long, of which 3/16 in. is used on each end for a hook joint. The top and bottom edges are wired. The bottom of the pan is made of 28-gauge blue polished steel. It is burred up ¼ in. all around. The body is either welded or riveted to the bottom.

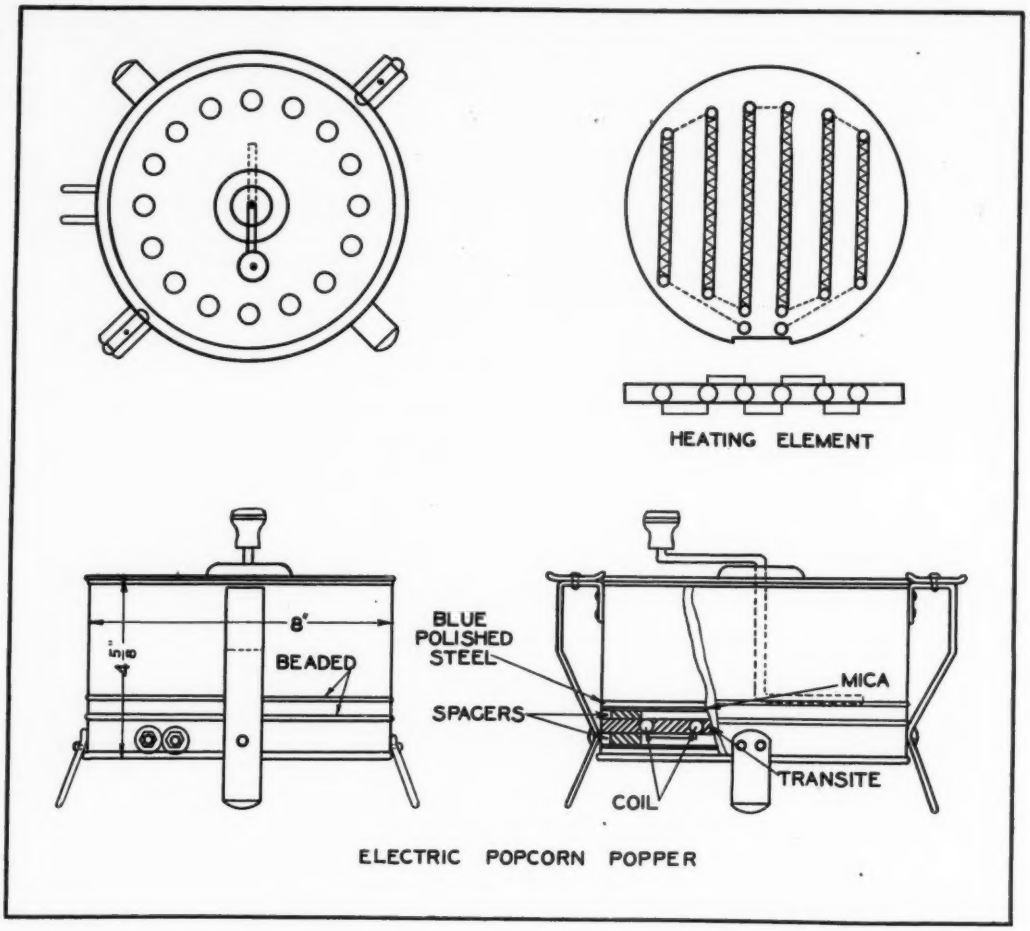
The top is cut from the same material used for the body. A circle with a 4 3/4-in. radius is marked with the dividers or compass on the material, and it is then cut out with the tin snips. It is next burred on the burring machine. The edge may be turned over for a small-size wire fold or set down tight with a wooden mallet.

Dish a small piece of metal about 2 in. in diameter outward ⅜ in., and rivet to the top with two No. 10 rivets. This acts as a brace to hold the handle in place and keep it from wabbling. The crank is made of ⅛-in. welding rod about 9 in. long bent in the shape shown. The crank is turned when the corn is popping to keep the corn in motion. The knob may be purchased or cut out of wood.

The feet and handles hold the popper ¾ in. from the table and are made from 24-gauge blue polished steel or other metal of the same gauge and nickel plated. No. 10 rivets are used to rivet the handles and feet to the body and to rivet the clamps to the handles. The clamps fasten the cover down tight.

In winding the coils for the heating element, two people should work together. A piece of transite is cut to fit underneath the bottom of the pan. Fourteen 3/16-in. holes are drilled in the transite to hold the coils in place. When winding the coils, place a ⅛-in. welding rod in a No. 1 Miller Falls hand drill. Fasten one end of the wire for the coil in the chuck of the drill with the welding rod. Then wind about 2 in. of the wire on the rod. Place this 2 in. of wire which is wound on the rod between two hardwood blocks. Place the blocks in a vise and turn the rest of the wire on the rod. By using the blocks the wire will be wound tighter on the rod. Care must be taken so as not to kink, break, or tangle the wire while winding.

After the required amount of wire is wound on the rod for a 660-watt current, remove the wire and rod from the chuck and pull the coil off the rod. Divide the coil to fit the transite, but do not cut the wire. Weave the coil in and out as shown and fasten the ends with small machine screws until ready to assemble.



ELECTRIC POPCORN POPPER

A sheet of mica is cut to fit next to the bottom of the pan. This is to protect the coil from the metal. Spacers of transite are placed on both sides of the disk with the heating coils and the whole is bolted to the two bottoms.

A piece of asbestos paper is put next to the transite to protect it from the bottom. This bottom is made of No. 26 black iron and keeps the table from getting burned.

The plugs to which the coil is fastened are 1 in. long, with threads to fit 8—32 machine screws. Mica washers are placed next to the metal over the plugs. The plugs are made of 3/16-in. brass and project ¾ in. beyond the body of the popper. The plugs must be covered with asbestos tubing where they go through the metal. Bright iron nuts or nickel brass nuts may be used.

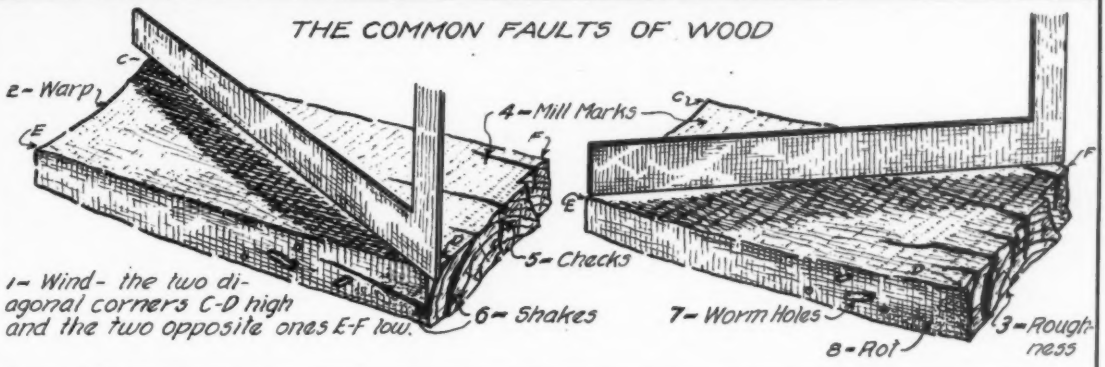
Eight feet of No. 14 type H heater cord, one heating-appliance connector, and a separable plug complete the project.

ELE. WOODWORK
CLIFFORD B. SMITH

SQUARING-UP PROCESS

UNIT INSTRUCTION SHEET— W-1

THE COMMON FAULTS OF WOOD



THE OPERATION— To make a rough board square and true to a definite size.

MATERIALS— Whatever project you may be working on.

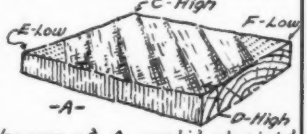
TOOLS— Straight edge, try square, jack plane, knife, rule, pencil, marking gage, back saw, bench hook, hand saw.

DIRECTIONS— The jack plane should be set for fine lacelike shavings, with the cutter edge keen and true. The point on the marking gage should be sharp.

There is no "hard and fast" rule for squaring a board. Learn to adapt your method to the work at hand.

1- FACE SIDE— This is the most important step, for if it is wrong, all that follows is wrong. Cut the board to its approximate size, removing rot, worm holes, shakes, etc.

A— Test for Wind. Test the better of the two sides in the manner shown above. When a board is in wind, two diagonally opposite corners test high, while the other two are low. Plane across the high corners as shown at -A- until straight.



B— Plane for smoothness. Begin at the left as shown at -B- Work stroke by stroke until face is planed once and repeat until smooth. Very fine shavings should be taken. Press down firmly on the plane during stroke and pick up at the end.

C— Test for straightness lengthwise.

D— Test for straightness across the width. When the board is hollow (warped) it can be easily trued by planing across grain, with a sliding cut until full length shavings are obtained.

When these four tests are correct, we have a working face or face side. Mark it with a light cross. It is a side we may test from.

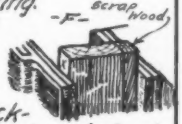
2- FACE EDGE— Plane the better of the two edges as shown at -C- Note the position of the left hand and the plane bed on the edge for its full length. Take full length, full width shavings. If one arris is higher than the other, plane as shown at -D-

A— Test for squareness with face side as shown at -E-

B— Test for straightness in length.

If true mark with a cross. The face side and face edge will be used to test from.

3- FIRST END— Clamp wood as low in the vise as practical and place a piece of scrap wood as shown at -F- to avoid splitting. Have the face edge toward you. Plane end for full shavings, picking plane up at end of cut.



A— Test for squareness with the face side.

B— Test for squareness with the face edge.

4— LENGTH— Measure the length as shown at -G- with rule on edge on the face side, along the face edge and measuring from the first end. Make a knife dot and thru this dot square a knife line all around piece, as shown at -H- Saw off surplus wood just slightly outside of knife line. This can be done either in miter box or with back saw and bench hook.

Clamp in vise as at -F- and plane.

A— Test for squareness with face edge. See -I-

B— Test for squareness with face side.

C— Stop at knife line.

5— WIDTH— Gage lines for the width as shown at -J-. The gage is held firmly against the face edge.

A— Stop planing at gage lines.

B— Test for squareness with face side.

C— Test for straightness in length.

6— THICKNESS— Gage the lines for thickness from face side.

A— Stop planing at gage lines.

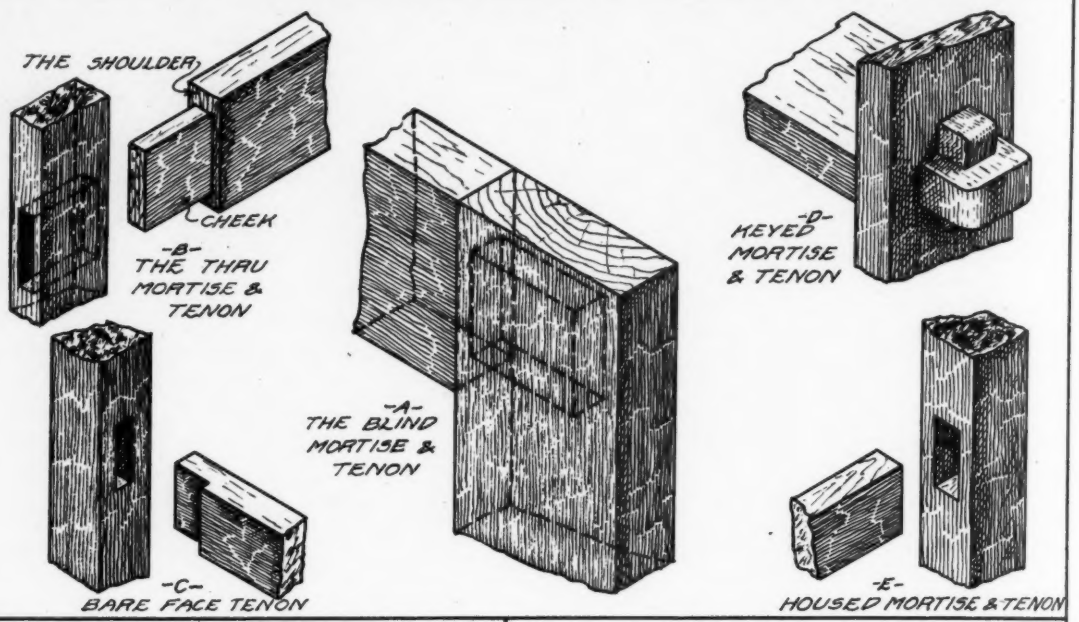
B— Test for straightness in length.

C— Test for straightness in width.

ADV. WOODWORK
CLIFFORD B. SMITH

MORTISE-TENON JOINT

UNIT INSTRUCTION SHEET — W-120



WHAT IT IS— The mortise and tenon joint is one of the strongest and most useful of any used in woodwork. As it is rather difficult to make, the dowel joint is often used in its place, especially in poorer grades of furniture. The dowel joint is usually a poor substitute for it.

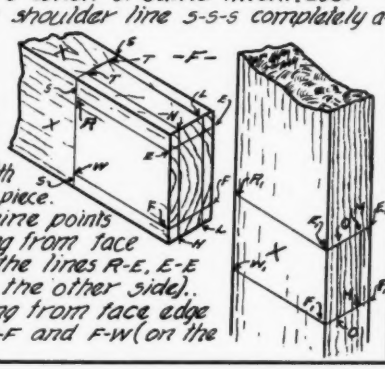
The joint consists of two main parts, one the tenon, which is the whole or partial part of the end of a piece of wood; the other is a mortise or hole, which is formed in a second piece in the desired place. The two must fit together firmly and accurately.

TOOLS— Try square, marking gage, brace, auger bit, chisels, back saw, mallet, knife.

DIRECTIONS— We have three groups of joints shown above, 1- both pieces the same thickness making the surfaces flush, 2- pieces of different thickness, 3- special methods of securing tenon. (Adapt to 1 or 2).

1- Procedure when of same thickness.

a- Square shoulder line S-S-S completely around the wood with try square and knife. Distance R-E is equal to R,-E, the width of the other piece.



b- Determine points R-W. Working from face edge, gage the lines R-E, E-E and E-R (on the other side). Still working from face edge gage W-F, F-F and F-W (on the other side.)

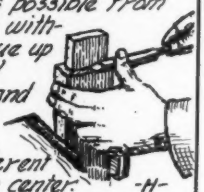
c- Determine points R-W on the second piece by measuring directly from the first. Square fine pencil lines R,-E, , E-E, and W,F, , F-F, and across the edge not seen.

d- Determine points T-T on the shoulder line. From the face side of each piece use gage to obtain first lines T-H, H-H, H-T and O-O on both edges of second piece. Do the same to obtain T-L, L-L, L-T and H-M.

e- Saw tenon with back saw in the manner shown at -G-. Note that the saw kerf comes exactly up to the gage line and remains entirely on the outside. This is very important. Stop slightly before shoulder line.

f- With back saw cut off the outside pieces just a little way from the line S-S-S. The tenon will appear as shown at -H-. With a keen chisel pare down exactly to shoulder line.

h- Bore as many holes as possible from both sides of the mortise without touching the lines. True up with chisel, fitting by trial the tenon to the mortise and making all corrections in the mortise.



2- Procedure when of different thickness is to work from center.

QUESTIONS— In order to have a strong joint the tenon must fit all around snugly to the mortise. Why would it not do to fill up the loose places with glue? Why do some manufacturers prefer the dowel joint to this one? In illustration -H- what precautions could be taken to avoid splitting at the corner? In what articles and places is the mortise and tenon joint used?

SAMPLE UNIT INSTRUCTION SHEET TO ACCOMPANY SUPPLEMENT 150

HOLD EIGHTH ANNUAL CONFERENCE ON PRINTING EDUCATION

The eighth annual conference on printing education, which was held June 24 to 26, at the Carnegie Institute of Technology, Pittsburgh, Pa., was notable for its program and for the quality of the speakers. A total of 125 persons was in attendance from 21 states and the District of Columbia. A majority of those in attendance were present at each one of the eight sessions held during the three days of the conference.

The conference was divided into two divisions; namely, the printing industry, and education from the administrative and teaching viewpoints. At the session for the industry, the topics for discussion were "What the Printing Industry Offers Education," "Mechanical Advances in the Industry," "Type Design," "Machinery Obsolescence," and "Making Type Talk." Among the speakers were Mr. J. Horace McFarland of Harrisburg, Pa.; Mr. D. Loren Davis, of Chicago, Ill.; Mr. Sol Hess, of Philadelphia, Pa.; Mr. John Farnsworth, Benton Harbor, Mich.; Mr. Edwin H. Stuart, Pittsburgh, Pa.; Mr. John Gwyer, Pittsburgh, Pa.; Mr. F. F. Nicola, Pittsburgh, and Mr. George Ortleb, St. Louis, Mo.

At the session for education, Supt. W. M. Davidson of Pittsburgh, talked on the subject, "What Education Offers the Printing Industry"; Dr. W. T. Bawden spoke on "The Outlook for Vocational Education"; Mr. J. Henry Holloway of New York, talked on "Problems in Preparation of a Vocational Curriculum"; Mr. G. A. McGarvey of Washington, D. C., discussed "Modern Apprenticeship"; Mr. P. L. Cressman of Harrisburg, spoke on "Printing as a General Shop Subject"; and Mr. Otto W. Fuhrmann discussed "Craftsmanship and Education." Other speakers on the program were Mr. John L. Porter of Pittsburgh, Pa.; Mr. Arthur C. Jewett of Pittsburgh; Mr. Frank M. Leavitt of Pittsburgh; Dr. Gerald Whitney of the University of Pittsburgh; Dr. R. M. Ihrig of the Carnegie Institute of Technology; Miss Jean Barr, New York University; Mr. Joseph Speer, Pittsburgh, and Mr. M. W. Haynes of Jersey City, N. J.

Teachers of printing who contributed to the program were Mr. Allan Robinson of Baltimore, Md., who arranged and had charge of the exhibit of teaching devices; Prof. M. K. Dutton of the Carnegie Institute of Technology, who discussed "Printing in Europe," and Mr. E. E. Sheldon of Chicago, who acted as judge in the mock trial—"Printing Education on Trial."

Papers were read by Mr. E. G. Ingraham, of Kingsport, Tenn.; Mr. Chester A. Lyle of Canton, Ohio; Mr. Walter B. Gress, of Pittsburgh, Pa.; Mr. G. U. Cleeton, of Pittsburgh; Mr. Ralph P. Gallagher, of Elizabeth, Pa.; Mr. V. V. Young, of Pittsburgh; and Prof. David Gustafson, of Pittsburgh. A topic of general interest to the teachers was that of "Progress in Trade Tests," discussed by Dr. W. B. Jones, research professor of higher education. Dr. Benjamin Woods of Columbia University was also a speaker. A total of six trade tests were discussed by teachers of printing.

Mr. Fred J. Hartman of the United Typothetae of America, Chicago, was chairman of the conference, assisted by Mr. Ira D. Pilliard, of Milwaukee, Mr. R. W. Polk, of Detroit, and Mr. George C. Huckins, of Buffalo.

MEETING OF THE VOCATIONAL DEPARTMENT OF THE N. E. A.

The Department of Vocational Education of the N. E. A. held its annual meeting July 1 and 2, at Atlanta, Ga., with Homer J. Smith of Minneapolis, presiding.

The subject for discussion at the meeting was "Education for a New World." Mr. Paul W. Chapman, state director of vocational education in Georgia, presided at the first session. Mr. T. E. Browne of Raleigh, N. C., talked on "A Progressive State-Wide Program of Vocational Education"; Dr. Adelaide S. Baylor of Washington, D. C., discussed "New Problems in Homemaking Education"; Mr. B. E. Harris of the University of Alabama, took for his subject, "New Features in Trade and Industrial Education Programs."

At the second session, Mr. J. B. Hobdy, state director of vocational education for Alabama, presided. Mr. D. M. Clements of Nashville, Tenn., discussed "The Place of the F. F. A. in Training Farmers"; Mrs. Anna L. Burdick of Washington, D. C., talked on "The Future of Part-Time Education"; and Mr. John T. Wheeler of Athens, Ga., took for his subject, "New Aspects of Farmer Training." The meeting closed with a general discussion and the election of officers.

The officers elected for the ensuing year were as follows: President, Mr. Paul W. Chapman, Athens, Ga.; vice-president, Mrs. Anna L. Burdick, Washington, D. C.; secretary, Mr. Ray Fife, Columbus, Ohio.

Illinois Vocational Society Will Hold Meeting in Chicago

The officers of the Illinois Society for Vocational and Practical-Arts Education are busily engaged in completing plans for the convention arrangements for the meeting of the Society to be held November 1 and 2, at the Hotel Sherman, Chicago, Ill. Mr. Albert W. Evans, principal of the Tilden Technical High School, Chicago, and Mr. C. C. Willard, principal of the Phillips Senior High School, are in charge of the local arrangements.

Officers of this organization are: President, Albert F. Siepert, Dean of Education, Bradley Polytechnic Institute, Peoria, Ill.; secretary, Urban G. Willis, Principal, The Pullman School, 250 E. 111th St., Chicago, Ill.; and treasurer, N. F. Fultz, Vocational Director, Morton Township High School, Cicero, Ill.

Vice-Presidents: For Agricultural Education—Edward J. Tobin, superintendent of schools, Cook county; For Art Education—Lucy S. Silke, supervisor of art, Chicago Public Schools; For Commercial Education—Benj. J. Knauss, director of commercial work, Chicago public schools; For Home-Economics Education—Dora Wells, principal, Lucy Flower Technical High School, Chicago; For Industrial Education—Drew W. Castle, Vocational Director, Joliet Township High School; For Part-Time Education—C. A. Unnewehr, principal, South Side Continuation Shcools, Chicago; For Personal and Guidance—Anne S. Davis, director of bureau of vocational guidance, Chicago public schools.

Board of Directors: Albert W. Evans, principal, Tilden Technical High School, Chicago, Ill.; Grant Beebe, principal, Lane Technical High School, Chicago; L. W. Wahlstrom, Francis Parker School, Chicago; C. L. Jordan, assistant principal, Waukegan High School, Waukegan, Ill.; A. B. Mays, professor of industrial education, University of Illinois; Urban G. Willis, The Pullman School, Chicago, Ill.

MR. FARNUM EDUCATIONAL DIRECTOR OF ART SCHOOL

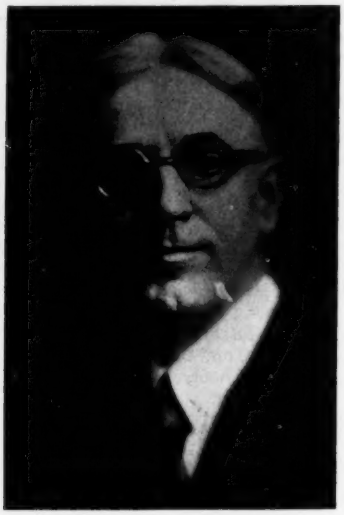
Mr. Royal Bailey Farnum, director of art education in Massachusetts, will resign to accept the new position of educational director of the Rhode Island School of Design, Providence.

The new position is the result of a slight reorganization due to the growth of the school and its museum. Mr. Earl Rowe, formerly in charge, remains as director of the museum, while Mr. Farnum is given all the rest of the school. This includes the Art School, the Jewelry School, the Textile School, and all of the half dozen or more buildings, with the exception of the museum itself.

In accepting the new position, Mr. Farnum intends to build up a school along the lines he has had in mind for an American school of art. Mr. Farnum has been recognized as a leader in the field of art education in public schools. The nine years as state director of art in New York, and the eight years spent as director of art education in Massachu-

setts, are part of the foundation upon which he can build his work in his new position.

Mr. Farnum brings to his new position not only a great deal of professional experience, but also a wide experience as author and editor. His writings on art education in New York and Massachusetts are authoritative and widely read.



Photograph by Bachrach.

ROYAL BAILEY FARNUM
Educational Director, Rhode Island School of Design, Providence, R. I.

Mr. Farnum is a member of the Eastern Arts Association, Western Arts Association, National Education Association, International Art Federation, and numerous other art and educational associations. Mr. Farnum has done considerable lecture work before teacher organizations, school and college students, and industrial organizations. He brings to his new position a large wealth of experiences and the INDUSTRIAL-ARTS MAGAZINE joins his many friends in wishing him the success which he so richly deserves.

MR. A. V. LARSON, head of the industrial education department of the State Teachers' College, Peru, Nebr., recently received the degree of master of arts.

MR. EDWARD DAVIS, head of the industrial work at the State Teachers' College, Hays, Kans., was given the master of arts degree in July.

MR. M. HOFFMAN, of Radnor, Ohio, has been appointed as a full-time, Smith-Hughes vocational-agricultural teacher at Tiro.

MR. LESTER L. LOVE has been appointed as full-time vocational-guidance specialist in the Oregon State College at Corvallis, Oreg.

The state board of vocational education at Raleigh, N. C., has reorganized with the appointment of MR. LUTHER H. HODGES, Spray; MRS. T. E. JOHNSON, Salisbury; MR. LELAND H. KITCHEN, Scotland Neck; DR. A. T. ALLEN, state superintendent, Raleigh.

MISS BEATRICE GANT, of Indianapolis, Ind., has been appointed supervisor of art at Seymour.

MR. JOHN N. WEISS, of Dixon, Ill., has been appointed president of the Illinois State Association of Vocational Agriculture Teachers. MR. C. M. HATLAND has been appointed vice-president, and MR. W. S. DYAR, secretary-treasurer.

A CORRECTION

On page 253 of the July, 1929 issue of the INDUSTRIAL-ARTS MAGAZINE, the booklet entitled "A Captain of Industry" is obtainable from the David Maydole Hammer Co., Norwich, N. Y. This little booklet gives an interesting sketch of the invention of the adz-eye hammer.

NOW, ARE THERE ANY QUESTIONS?

Applying Decalcomania Transfers

883. Q.: I am making a solid walnut tilt-top table and desire to finish it in lacquer with a transfer picture on the top. Please give method of preparing the wood for the transfer and applying the same.—*E. M.*

A.: Build up the finish in lacquer as is usually done, water sanding and rubbing completely on the last coat. Use the transfer varnish supplied with the decalcomania designs and coat the back of the transfer. Let dry until tacky and then rub down the decalcomania with a pad of cotton. Let the work harden overnight if necessary, then wash off the thin tissue-paper coating to reveal the design. For the protection of the transfer design, spray on a mist coat of lacquer, avoiding any tendency to spray on a wet coat which may have a tendency to lift the design and spoil it. If no lacquer is available as a clear spray, then thin down a little of the transfer varnish which can be applied with a small, soft-bristle brush. Let dry until well hardened before putting in service.—*Ralph G. Waring.*

Individual Instruction Sheets

885. Q.: I am attending New York University this summer and have a thesis to prepare for one of my classes. The subject is "The History and Development of the Individual Instruction Sheet." I am more interested, of course, to see the thing from the vocational standpoint, but I wish to trace the history of job sheets from the very beginning.—*F. E. B.*

A.: It will be very difficult to determine with any degree of accuracy the exact beginning of the individual instruction sheet. Individual instruction has been used for many years in some phases of commercial instruction. Take for instance, bookkeeping, which has been taught by the individual instruction method for many years. Of course, the individual instruction in this subject was tied up with class instruction, although the opportunity was offered to one student to advance faster than another.

The method of analyzing a course into individual instruction units, is traceable to Chas. R. Allen, whose book "The Instructor, the Man, and the Job" you no doubt possess or have access to. This book is published by J. B. Lippincott Co., Philadelphia, Pa. Other books which may be helpful are: Robert W. Selvidge's "How to Teach a Trade"; also his book on "Individual Instruction Sheets." These are published by the Manual Arts Press, Peoria, Ill. W. H. Kilpatrick's "The Project Method," published by Teachers College, Columbia University, is one of the earlier books on the project method. "Education on the Dalton Plan" by Helen Parkhurst, E. P. Dutton & Co., New York City, 1922, and "Monograph on Unit Instruction Sheets and Individual Instruction" by Rodgers and Furney, C. F. Williams Co., New York, also may be helpful to you.

NEW PUBLICATIONS

Simple Aerodynamics and the Airplane

By Charles N. Monteith. Cloth, 420 pages, 5⅞ by 8⅜, illustrated. Price, $4.50. Published by The Ronald Press Company, New York City.

This book is a third revision, enlarged and brought up to date. It treats the subject of aerodynamics in a technical way for the study of aeronautics in schools, colleges, and universities. The book is also admirably suited for the study of aeronautics by anyone interested in that subject. It treats of airplanes in a general way, then takes up the design of air

(Continued on Page 26a)

Dressing Properly for the Shop

No wonder the boy in the above picture smiles. He is ready for work just like the men in the big factories; no tie, collar open for comfort, sleeves rolled up to the elbow, and clothes protected by an apron. Sweaters and coats should not be worn in the shop. Avoid wearing loose-fitting clothing, jewelry on the hands, or gloves around machine tools. Better be safe than be sorry!

Safety Series—Earl L. Bedell and George Peacock, Detroit, Mich.

© Industrial-Arts Magazine

Turning on the Power

"Sleeves up, ties in, then stand clear of the machines," is the warning cry of the boy who is about to turn on the power in the machine shop. He is just telling the boy nearest to him "Tuck in that tie too, before I turn on the switch." Prompt acceptance of this advice prevents avoidable accidents. The same words and the same actions repeated day after day, will help you acquire the proper habits. Listen to information about the dangers which surround you. Cooperation and courtesy prevent accidents.

Safety Series — Earl L. Bedell and George Peacock, Detroit, Mich.

© Industrial-Arts Magazine

Don't try this with any screw driver except the new Stanley 100 plus

"BUILT TO STAND ABUSE" is the best description of this new Stanley Screw Driver.

It will stand being hammered. The tip is tough enough to cut iron rivets, screws or nails without fear of damage. It can be used for prying. The tip can be resharpened with a file—thus eliminating the tendency to draw the temper on a grinding wheel.

You can certainly use screw drivers like these in some of your shops. Even though you may not subject them to these tests of strength, nevertheless this built-in quality gives you a safety factor that means long life and service.

The "One Hundred Plus" screw driver is scientifically constructed. It has a forged steel blade, tempered its entire length. Tough hickory handle is capped with leather.

Recommended for use in your electrical, automobile, sheet metal and machine shops—anywhere that a real rugged screw driver is required. Made in 4 sizes: 4"-5"-6" and 8" blades.

THE STANLEY RULE & LEVEL PLANT
Educational Department
New Britain, Conn.

STANLEY TOOLS

Stanley Equipment is Standard Equipment

STANLEY TOOLS

See the Points?

Can you describe the "Point" of a twist drill?

Do you know what the "Dead Center" is?

Could you explain "Lip Clearance"?

Or "Margin" and "Body Clearance"?

These, and the answers to a dozen other questions, make the Handbook for Drillers the outstanding textbook on twist drills and drilling practice in America. The Handbook is now being used by several hundred vocational schools.

As our contribution to the cause of education in correct machine shop practice, we shall be pleased to forward to you any reasonable quantities of the Handbook for the use of your machine shop classes.

The CLEVELAND TWIST DRILL COMPANY CLEVELAND NEW YORK-CHICAGO-LONDON SAN FRANCISCO

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

(Continued from Page 362)

foils, resistance, the propeller, lift and drag, rate of climb, landing speeds, airplane engines, accessories, etc. The appendix gives quite a glossary of aeronautical terms, together with a number of problems in simple aerodynamics and a rather complete bibliography.

Applied Arithmetic for Girls

By Nettie Stewart Davis. Cloth, 126 pages, 5¼ by 7¾, illustrated. Price, 88 cents. Published by The Bruce Publishing Company, Milwaukee, Wis.

This is a completely revised edition of "Vocational Arithmetic for Girls" under which name it was favorably known in part-time and full-time vocational schools, junior high schools, and technical high schools. The problems are carefully chosen for their practicability and direct application to the life experiences of the average girl. Especially interesting are the home-makers' problems in which budgeting, insurance, banking accounts, etc., are taken up.

Science of the Home

By N. B. Giles and Dorothy G. Ellis. Cloth, 161 pages, 5¼ by 7⅞. Price, $1.50. Published by John Wiley & Sons, Inc., New York, N. Y.

This little textbook is very well suited for the study of related science in home economics, in junior high schools, senior high schools, and part-time vocational schools. It covers in a readable way the science pertaining to foods, health, heating and ventilating, the machines at the home, lighting, and clothing.

Constructive Lettering

By William D. Streetor. Cloth, 112 pages, 8¼ by 11¼, illustrated. Price, $5.00. Published by Bridgman Publishers, Pelham, N. Y.

This book is confined to the formation of letters. It gives explicit directions for the spacing of the individual letters as well as the letters in combination with each other. Its price, however, will undoubtedly prevent it from being generally accepted as a textbook.

House Painting.

By A. H. Sabin. Cloth, 196 pages. Price, $1.80. Published by John Wiley & Sons, New York City.

This is the fourth edition of a book which was first issued in 1908, and which has had a wide sale among painters, as well as householders, for whom it is generally intended. The present edition has been revised to bring the work up to present-day practice in the selection and use of materials. New sections on painting barns and similar buildings have been added.

The genuine value of the book lies in the clear, untechnical statement concerning the selection of materials and the processes of exterior and interior painting, glazing, calcimining, and wall papering.

Blue-print Reading

By W. W. Sturtevant. Paper, 136 pages, 9 by 11¼, illustrated. Price, $1.90. Published by McGraw-Hill Book Co., Inc., New York City.

This text on blue-print reading presents quite a large number of problems. The book is built up on the principle that making the actual drawings is the best way of teaching the reading of drawings. For this reason the drawing of an object is shown, and then the pupil is given hints which assist him in making drawings on the pages of the book itself.

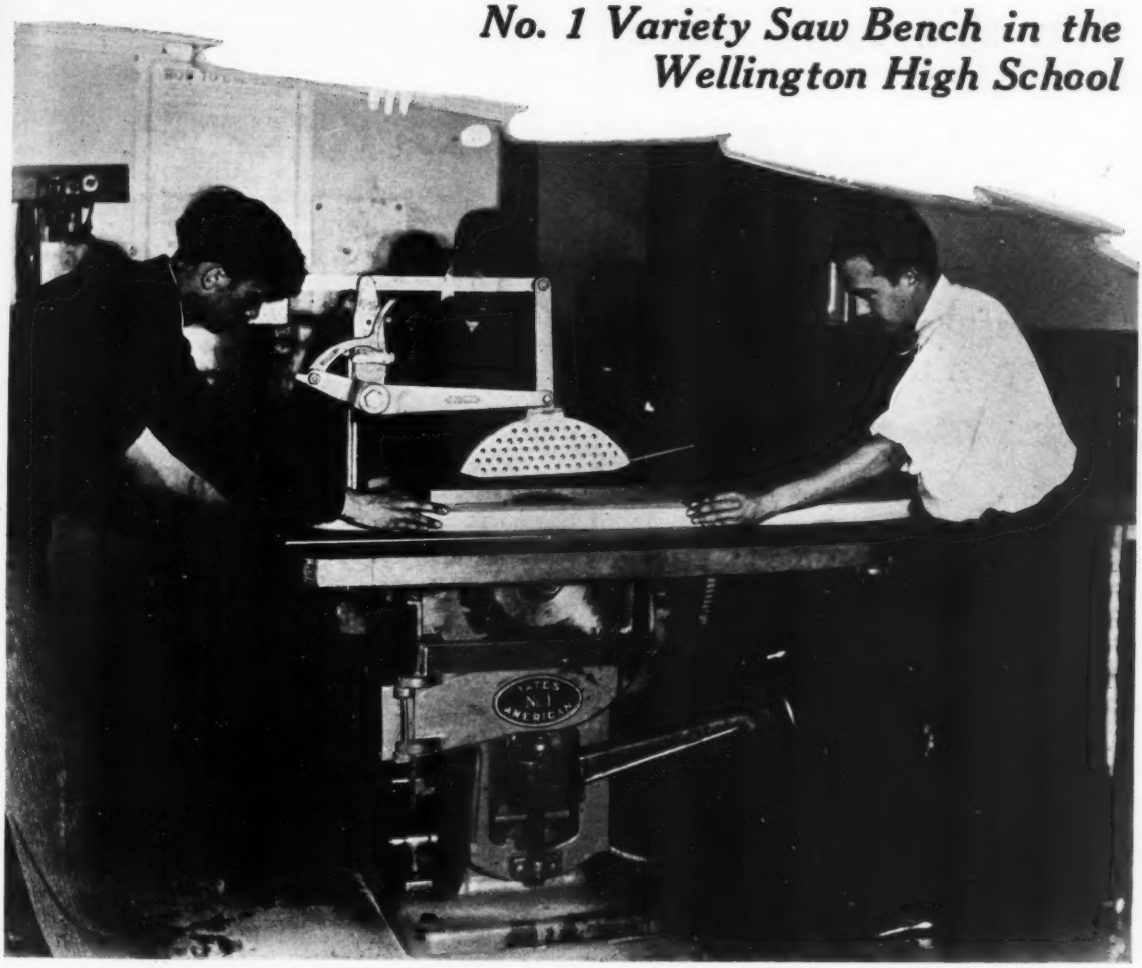
Related Science Manual

By Dorothy G. Ellis and N. B. Giles. Cardboard cover, 111 pages, 8⅛ by 10⅝. Published by John Wiley & Sons, Inc., New York City.

This laboratory guide for vocational home-economics classes is very conveniently arranged. The subject of food, physiology, water, air, heat, simple machines, light, electricity, and textiles, are covered. All of the experiments are printed on loose-leaf pages which are held together between stiff paper covers. The directions for performing the experiments are simple and concise. Space is given for noting observations,

(Continued on Page 28a)

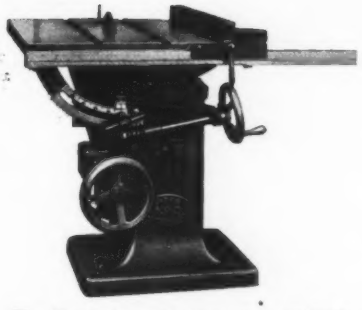
No. 1 Variety Saw Bench in the Wellington High School



MR. A. W. SHIELDS, superintendent of the Wellington High School, Wellington, Ohio, is but one of many satisfied users' of the No. 1 Variety Saw Bench. The above illustration shows this saw in operation in the manual training department of that school.

Mr. Shields chose the No. 1 for practically the same reasons that the majority of the industrial woodworking executives select it for their production. It is substantially constructed for the most enduring service. It is direct motor driven and ball bearing equipped. The machine can be furnished with sliding table, boring attachment; can be used for jointing and dadoing, and will accomplish the widest range of work.

It is the majority opinion among school woodworking executives today that only the most popular industrial type machines can fulfill all school requirements. That is why the No. 1 and other Yates-American type school machines are in strongest demand. Write for complete information.



The No. 0 is a smaller, more moderate priced machine than the No. 1 yet it is capable of doing a very wide variety of jobs. It also has a tilting table; the arbor is direct motor driven and runs in ball bearings and it is most ruggedly constructed. A universal saw guard is also furnished, on special order, to make it safe to operate.

"Train Your Students Today on Machines They Will Use Tomorrow"

YATES-AMERICAN MACHINE COMPANY

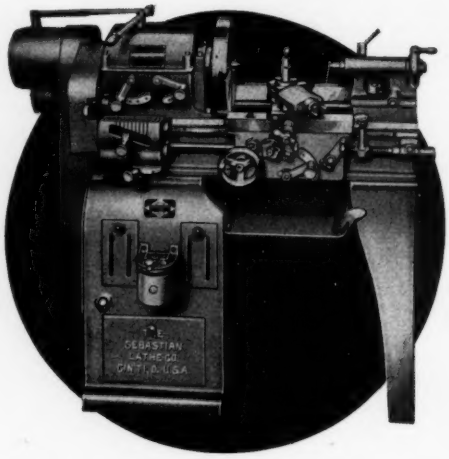
Vocational Division

BELOIT, WISCONSIN.

You still have time to install—

SEBASTIAN
Gold Seal
LATHES

before classes re-open next month



The 11-inch Gold Seal Heavy Duty Lathe was built to fill the need for a small, high speed lathe capable of production work and at the same time incorporating all the features necessary for extremely close precision work. It is therefore ideal for use in the school shop.

We do not know of another lathe of comparable size offering all the advantages to be obtained in the Sebastian Gold Seal. It is built throughout to be the heaviest 11-inch lathe. Bearing surfaces are larger than are ordinarily considered adequate, all gears are of steel, and the metal in bed, frame and housings is so distributed that it will stand up under the most severe use. The lathe is therefore practically breakproof—and boyproof. Further precaution is taken, however, to guard against accidental overloads which might be dangerous. A safety shear pin is provided at the end of the quick change box. This pin will shear before any damage can be done to the lathe itself.

The motor of the Gold Seal Lathe is built in the leg beneath the headstock. Drive is through a motor chain and steel gears—all carefully guarded. Speeds are obtained through the two levers on the front of the headstock. Start and stop is through a friction drive controlled by a convenient lever. Feeds and threads are all controlled by the two levers on the quick change box and one sliding on the quick change tumbler shaft.

A complete description of Sebastian Gold Seal Lathes will be sent upon request

THE SEBASTIAN LATHE CO.
CINCINNATI, OHIO

NEW YORK OFFICE - Room 372 - 50 Church St.

(Continued from Page 26a)

and a number of questions on each experiment test the knowledge which the student has gained by performing the experiment.

Vocational Readings

By Leverett S. Lyon and A. Marie Butler. Cloth, 571 pages, 5¼ by 7¾. Published by The Macmillan Co., New York City.

This book was prepared as a companion volume of the text "Making a Living" by Leverett S. Lyon. It may, however, be used independently of that book, either for supplementary reading or as a basis for the studying of English. The subject matter is a compilation of much that is exceedingly interesting. The book is divided into six parts: Things that count, community life, business, the professions, government, and vocational preparation.

The book should find a welcome in high schools and junior high schools were social studies are taken up.

Bookbinding

By Wm. F. Matthews. Cloth, 252 pages, 5 by 7⅜. Price, $2.75. E. P. Dutton & Company, New York, N. Y.

The subtitle designates this book accurately as "a manual for those interested in the craft of bookbinding." The author takes for granted that the reader has some basic knowledge of the subject and some experience in the craft. He, therefore, discusses correct procedure in using the basic processes. Emphasis particularly placed upon those methods and processes which result in lasting and beautiful handbound books in the library, blank-book (hollow back) and flexible styles. A few of the terms used are a bit British, but use of the glossary at the end of the book should overcome any real difficulties.

The Use of Style and Design in Industry

Paper, 44 pages. Published by the Metropolitan Life Insurance Co., Policyholders' Service Bureau, New York, N. Y.

American manufacturers of today have injected the element of beauty into the most common articles of daily use. The present pamphlet presents the results of a survey made by the Metropolitan Life Insurance Company governing the use of style as involved in all manufactured products. The pamphlet shows the influence of design and color in the production of clothing, silverware, paper novelties, textiles, silk, rubber, and many other lines. The purpose of the pamphlet is to show that though great profit has been obtained from the intelligent use of style and design, still greater advances are possible through more adequate and complete provision for coordination of style and design, suitable training for stylists in all the industries, a more intimate exchange of ideas between designers, craftsmen, and art schools, and the establishment of a proper balance between style and staple production.

Bulletin American Home Economics Association

Paper, 84 pages. The pamphlet contains the proceedings of the twenty-first annual meeting held at Des Moines, Iowa.

The report points out that the studies have given direction not only to the program of commercial education and training, but to the programs of guidance, placement, follow-up, and extension education. The senior commercial survey at St. Louis, Mo., provided a fact basis for the reorganization of the curriculum by gathering data on the distribution of commercial workers according to occupations, sex, age, number of years out of school, and education in day and evening schools. It showed that 66 per cent of the 2,100 commercial workers studied were in occupations not basically stenographic nor bookkeeping.

The survey of 4,040 commercial workers in Pasadena, Calif., was begun to find out what subjects should be included in the commercial curriculum, and what the content of these subjects should be. The report contained some helpful tables showing labor turnover, initial and subsequent salaries, personal qualifications of employees, and office equipment. In the study, it was found that 10 per cent of the workers were classified as doing work in bookkeeping and accounting, and 11 per cent in secretarial work.

One of the most valuable reports issued during the biennium, was the report of 8,200 women in clerical and secretarial

(Continued on Page 31a)

(Continued from Page 28a)

positions in 191 business establishments of Minneapolis. A feature of this report was the indifference of employers to the need of experience by workers. More than 58 per cent did not require experience, 31.8 per cent indicated some experience was required, and the remainder required certain minimum amounts of experience.

It is shown that there is little actual advancement for office workers, except for those in executive and secretarial positions. The survey showed that little effort is put forth by the public schools to find employment for the drop-outs and graduates. Less than 14 per cent of the commercial workers in the city were placed by the public schools, and more than 30 per cent were placed by the commercial employment agencies. The two outstanding studies were conducted by the division of research of the board of education, Cleveland, Ohio, and by J. T. Giles, state high-school supervisor of the department of public instruction, Madison, Wis. The latter study of 4,918 graduates from commercial departments of 108 Wisconsin high schools indicates that the commercial curriculums are better adapted to the needs of the girls than of the boys. Seventy-three per cent of the graduates from these courses are girls. Thirty-eight per cent of the girls who graduate, hold positions requiring a knowledge of stenography, and only 13 per cent of the boys hold such positions. Of the graduates from high schools employing more than 20 teachers, 9 per cent of the boys, and 57 per cent of the girls hold positions requiring a knowledge of stenography. The report also shows that the commercial course is better adapted to large schools than to small ones. Forty-five per cent of the graduates of the larger schools hold positions calling for stenography, while in the smaller schools, only 16 per cent of the graduates hold such positions.

The report concludes with the statement that very little has apparently been done toward studying business biographies and job analyses to find out the crucial factors more or less common for promotion, whether pertaining to general education, trait development, or technical education and training.

School Shop Equipment News

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.

NEW WORKACE ELECTRIC SHAPER

The J. D. Wallace Company, 134 So. California Ave., Chicago, Ill., has announced a new Workace electric shaper, something entirely new in the popular priced and portable line of shapers.

The Workace shaper is equipped with ball bearings. It is motor driven, and adequate means for lubrication are provided. In this machine, the belt has been eliminated, thus slipping, slowing down of operations, and loss of power is avoided. The shaper is mounted on a table with a screw arrangement, which permits it to be raised or lowered. It can be locked securely in any position by a handwheel. The spindle is a steel shaft 5/8 in. in diameter, which extends 3 5/8

(Continued on Page 32a)

Special Purpose Pliers
that help the Student to develop skill

SKILL — efficiency — precision — all those qualities which distinguish the professional from the beginner — your students will acquire them with amazing rapidity when they have access to these *special purpose* Vacuum Grip patterns, created by master craftsmen of tool design.

More than this—in supplying the student with the right pliers for every job you instill in him principles of accuracy and thoroughness that can not be cultivated where makeshift tools are used.

The long life of Vacuum Grip Pliers—*which time will prove*—renders their use *a true economy.* Unlike ordinary pliers made of case hardened (surface hardened) open hearth steel, Vacuum Grip Pliers are hammer forged from F. S. P. analysis Silico-Molybdenum tool steel, hardened by a liquid heat treatment and *electrically and oil tempered THRU AND THRU. Strong to the very core!*

No 186—Electricians' Diagonal Cutters. Length 6 in. No. 185—5 in. Very powerful, designed for heavy cutting jobs. Cutters remain in permanent alignment. Mechanics' Patterns — No. 85—5 in. No. 86—6 in.

No. 77—Electricians' Many Purpose Pliers. Length 7 in. Flat nose for pulling wires and stripping insulation. Curved jaws for gripping nuts etc. Fashioned handles. No. 75—5 in. No. 76—6 in. No. 78—8 in.

No. 67—Thin Nose all-around Pliers. Length 7 in. Many uses. Capacity far exceeds size. Adjustable joint; side wire cutters. No. 65—5 in. No. 66—6 in.

SUPERVISORS: Write for prices of patterns illustrated in lots of one dozen or less. Send for Catalog of over 40 patterns and sizes.

FORGED STEEL PRODUCTS CO.
Newport, Pa.

Vacuum Grip REG. U.S. PAT. OFF. Pliers

BUILT *UP* TO A STANDARD NOT *DOWN* TO A PRICE

USED AND ENDORSED BY LEADING MANUAL TRAINING SCHOOLS

Kewaunee

Choose Furniture

from the

New Kewaunee Book

Buyers of School Equipment for Kindergarten and Primary Grades, Elementary Schools, Junior and Senior High Schools and Teacher Colleges, will find it profitable to use the Kewaunee Book. It shows all the very newest Kewaunee time-saving, space-saving and money-saving equipment, including complete line of

—Library Furniture.
—Art Furniture.
—Mechanical Drawing Furniture.
—Manual Training Benches and Equipment.
—Manifold Desks and Chairs.

Kewaunee Furniture is used in thousands of Schools throughout the United States. It increases the student capacity of school buildings—it makes classes easier to handle—it cuts the cost of original installation and will stand severe use for many years. Kewaunee Furniture gives you the biggest value for the money invested.

Write For Kewaunee Book — Free

If you will send us your name and address we will mail you free and postpaid a copy of the new Kewaunee Book. Write today.

SEE OUR DATA IN BRUCE'S SPECIFICATION ANNUAL 1929 EDITION

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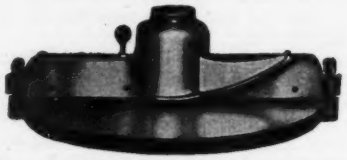
Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges
1 End South Center St., ADRIAN, MICH.

Kewaunee

(Continued from Page 31a)

in. above the table top, and provides a capacity of 2½ in. between two steel shaper collars, or 3¼ in. when using solid cutters. The machine is provided with a General Electric

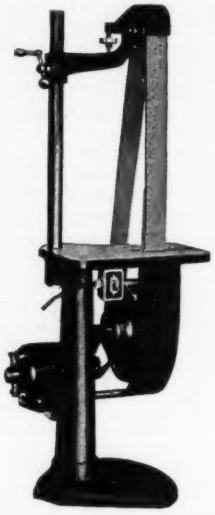


A COMBINATION GUARD AND FENCE CAN BE SUPPLIED EXTRA

Universal motor, which can be used on an ordinary lighting circuit, 110 or 220 volts, d.c., or 25 to 60 cycle a.c. It weighs only 42 pounds and stands firmly on its own base without fastening.

NEW PORTER-CABLE B-6 SANDER AND GRINDER

The Porter-Cable Machine Company, of Syracuse, N. Y., has announced its new type, B–6 portable, irregular sander and grinder, which has been used successfully for surfacing intricate and irregular parts in the woodworking shop.



The new Porter-Cable sander has a table 13 by 19 in., with a ball-bearing idler pulley 5⅛ by 3 in., a drive pulley 14¼ by 3 in., and a ½-h.p. ball-bearing motor. The machine has an abrasive belt speed, either 1,975 ft. per minute, for wood, or 3,425 ft. per minute, for metal. Abrasive belts from ½ in. to 3 in. may be used to suit requirements. The machine has a net weight of 265 pounds.

NEW DISSTON COMPASS SAW

Henry Disston & Sons, of Philadelphia, Pa., have announced a new compass saw, with a square top handle and plunger attachment. The saw, which is intended for the

carpenter and mechanic, has a plunger attachment which permits the reversal of blades and facilitates close cutting, for work on moldings, siding, floors, and in close corners. The handles are of applewood and rosewood and have the Disston weatherproof finish. The plunger is casehardened to prevent wear. The insertion of the blade is very simple, yet it is positively held and there are no screws, levers, or wing nuts to tighten.

(Continued on Page 34a)

Prove the Merits of Art - Fibre Weaving

The making of woven furniture provides a fascinating practical handcraft at economical cost. No machinery is required. Special tools are not necessary. Classes may be conducted in ordinary classrooms. Suitable for grammar, junior high and high schools. Furniture made is practical and decorative. Weaving materials are made in many colors. Magazine trays, footstools, chairs, lamps, ferneries, sewing stands, rockers, davenports and other pieces of furniture of practical use in the home can be made.

Make This Magazine Tray

This magazine tray is 8¼ inches wide by 15 inches long and stands 15 inches high. All materials come to you ready to weave. Wooden base has holes bored, ready to insert stakes and dowels. Weaving materials furnished in attractive color combination of black and orange. Complete, step-by-step pictures illustrate and describe every operation essential to weave this attractive magazine tray. Materials cost only one dollar, plus a few cents for parcel post.

Materials for This Magazine Tray $1.00

Send $1.00 plus a few cents postage for the materials and directions for making this magazine tray. Weave this project and discover how really fascinating Art-Fibre weaving is; and of its many benefits for classroom work. A folder "How Can I Apply Art-Fibre Weaving to My School?" will be sent free on request. This folder answers many questions on the subject. It is of material benefit in starting new classes. Each school and each instructor decides the value of Art-Fibre weaving. No salesman will call on you.

Send ten cents in coin or stamps for the new BOOK OF DESIGNS AND MATERIALS. This book pictures, describes, and prices the many practical pieces of home furniture which can be woven with Art-Fibre. More than 100 different projects are pictured in this practical book. Many of these projects have never been shown before.

Magazine Tray No. 981—$1.00 plus postage: up to 150 miles 11 cents; up to 300 miles 16 cents; up to 600 miles 24 cents; up to 1000 miles 33 cents.
New Book of Designs and Materials 10 cents.

GRAND RAPIDS FIBRE CORD CO., 611 Myrtle St. N.W., Grand Rapids, Michigan

ANOTHER

In the series of American Walnut Designs . . .

NOW READY

The popularity of the previous measured drawings presented by this Association has been so great that we are offering a new design for the beginning of the current school year.

It was natural that the early craftsmen of the Colonies selected staunch American Walnut for the execution of such fine pieces as this little table. And, today, it is just as natural to resort to the beauty of figure and color, the strength and rigidity of American Walnut for the reproduction of this beautiful design.

Just fill in the enclosed coupon and send to us to secure your copy (or copies, if you desire several) of this measured drawing.

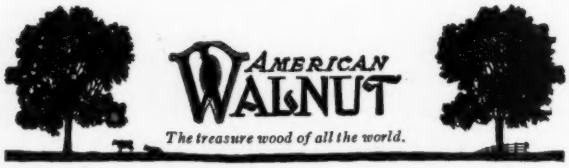
AMERICAN WALNUT MANUFACTURERS ASSOCIATION
Room 3413, 616 South Michigan Avenue, Chicago, Illinois

Please send me, gratis, your measured drawing of the Colonial "Tea Kettle" Table for reproduction in American Walnut.

Have you seen the newest edition of "The Story of American Walnut." A copy is yours for the asking.

Name _____

Address _____



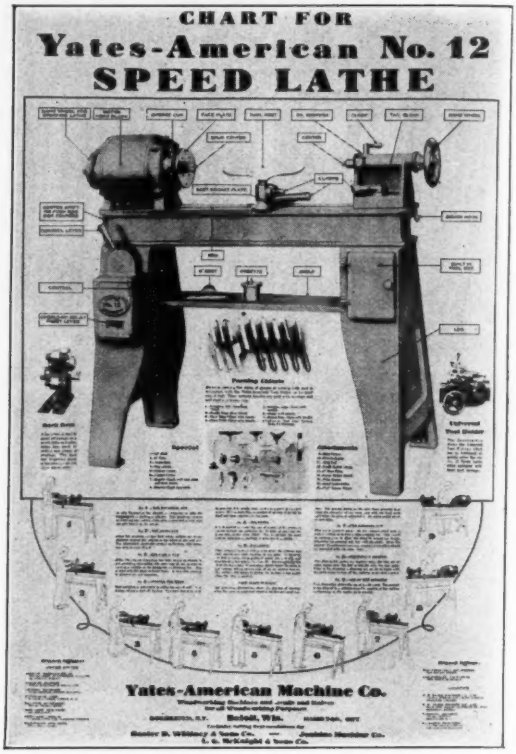
(Continued from Page 32a)

The plunger-type handle is adapted for use with the Disston No. 115 compass-saw blades.

Complete information and prices are obtainable from the Disston Company at Philadelphia, Pa.

NEW SPEED-LATHE CHART FOR WOOD-WORKING SHOPS

The Yates-American Machine Company of Beloit, Wis., has issued a new classroom chart for use with the Yates-American No. 12 speed lathe. The chart indicates the location and the name of each of the parts of the lathe. It also illustrates the operations of roughing, cutting to size, rounding, polishing, scraping, and faceplate turning.



This chart is free to all teachers of woodwork.

E. C. ATKINS COMPANY REELECTS OFFICERS

At the regular annual meeting of the E. C. Atkins Company, of Indianapolis, Ind., manufacturers of saws and tools, held at the company's office on May 22.

The present officers were reelected for the ensuing year as follows: President and general manager, Mr. Henry C. Atkins; vice-president and director of sales, Mr. Nelson A. Gladding; vice-president and general superintendent, Mr. William A. Atkins; vice-president and production manager, Mr. E. C. Atkins; vice-president and manager of the southwestern territory, Mr. K. W. Atkins; secretary and treasurer, Mr. F. C. Gardner.

The Atkins Company was established by the late E. C. Atkins in 1857, and is known as one of the world's largest institutions for the manufacture of saws, saw tools, and accessories.

NEW IMPROVED STARRETT MICROMETER

The L. S. Starrett Company, of Athol, Mass., has announced a new improved micrometer, which is divided into half thousandths. The device may be had on all micrometers, with the exception of Nos. 238 and 239, and is a valuable aid in working accurately to close limits.

The Starrett micrometer No. 436 may be had with the lock-nut feature. A knurled locking nut contracting a split bushing around the spindle, tightens and keeps the spindle

(Continued on Page 37a)

(Continued from Page 34a)

central and true, and with a slight turn locks it firm, making a solid gauge when desired.

The No. 440 micrometer depth gauge is furnished with a ratchet stop, which permits the same degree of pressure at the point of contact, and also eliminates the change of unequal "feel."

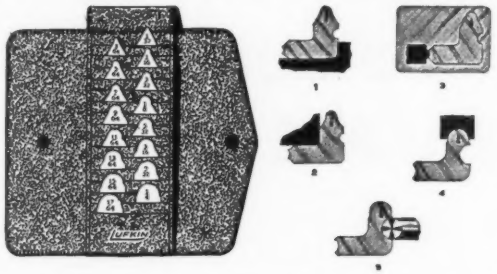
An added advantage to instructors and students is the micrometer graduations where the intermediate lines on the thimble are numbered consecutively. This method of marking may be had on all Starrett micrometers, excepting Nos. 238 and 239.

Complete information about these micrometers is available to any school official or instructor who will address the Starrett Company at Athol, Mass.

NEW LUFKIN RADIUS GAUGE

The Lufkin Rule Company, of Saginaw, Mich., has announced a new radius gauge, which is entirely different and has many added features of practical value to the school shop.

The radius gauge consists of sixteen individual gauges from 1/32 to 17/64 in. radii, by 64ths, all contained in a handy



leatherette folder. Each radius has an individual gauge, allowing the mechanic to select the particular radius used, and have it continually before him. A new feature is the attachment of both external and internal forms on the same gauge.

Complete information and prices will be sent upon request to any instructor or school official who will write to the Lufkin Rule Company at Saginaw, Mich.

Teacher Examinations

Examinations to establish eligible lists for teachers of elementary vocational carpentry, cabinetmaking, and pattern-making will be held September 28, at Jersey City, N. J. The requirements are the ordinary ones for teachers of Smith-Hughes classes. The salary schedule ranges from $2,200 to $3,800. Applications may be addressed to Mr. E. B. Kent, director of the department of manual and industrial education, Jersey City.

Civil Service Examination

The U. S. Civil Service Commission has announced a competitive examination for applicants desirous of becoming occupational-therapy aides in hospitals of the Veterans' Bureau throughout the country. The range of salaries for the position is $1,800 to $2,100 a year and promotion may be made to supervisory positions paying as high as $2,800 a year.

All applicants will be rated on physical ability, education, training, and experience.

Complete information may be obtained from the Civil Service Commission at Washington, or from the secretary of the Civil Service Board of Examiners, or any post office or customhouse in any city. Applications must be filed not later than December 30.

Stout Summer Session for 1929

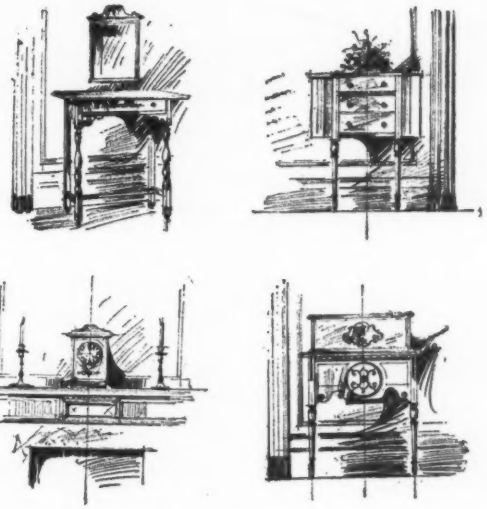
The 24th annual summer session of Stout Institute, which opened on June 17, had an attendance of 442—300 men and

(Continued on Page 38a)

Unusual

"Book of Projects"

Opens new opportunities for Vocational Shops



A book containing new opportunities for both teacher and student in vocational work. It has been designed and written by some of the outstanding furniture designers and educational leaders—men nationally prominent.

It shows a variety of projects for the beginner and for the advanced student — giving complete details and working drawings; showing the uses of ornament in various forms—illustrating these mouldings, ropes, beads, rosettes, etc., and showing how they can be applied.

The book will show forms of decoration hitherto available only to the manufacturers of fine furniture and will now place these decorations at the disposal of the student and teacher.

This book is now in the course of production — a book being beautifully printed; a fine example of the graphic arts.

Complimentary Copies

will be sent to Directors and Superintendents of vocational instruction. Write on your school stationery giving your position with the school and a copy will be sent.

The "Book of Projects" is offered to vocational students and others at only One Dollar per copy.

Klise Manufacturing Company
Grand Rapids **Michigan.**

Service uninterrupted while moving into our new and larger plant

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MILLION
ENVELOPES
in over
700
Styles
ready for
same day
shipment

The Western States Envelope Co.

Formerly
South Water
from Clinton
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Send for
PRICE LIST
NO. 30
and samples
of improved
"Brush-Gummed"
Envelopes

New Address after July 25th, 1929 . . . 740-752 South Pierce Street

(Continued from Page 37a)

142 women. Of the total number, 350 had attended previously, while 93 students were in attendance for the first time.

A strong program of speakers was arranged for the conferences and short courses. Dr. E. Lee Vincent, Anna Kloss, Adelaide Baylor, R. L. Cooley, George P. Hambrecht, Homer J. Smith, Henry Ohl, and Charles R. Allen were among those who addressed the students.

In connection with the summer school is a special summer-camp colony, which though secluded, is closely adjacent to the city. The school attracts a large number of experienced men and women who are anxious to further their professional preparation.

Vocational Guidance for Virginia

A system of vocational-guidance service for the schools of the state of Virginia has been provided with the appointment of Mr. C. J. Hyslup, of Norfolk, to the staff of the division of trade and industrial education of the state education department.

Mr. Hyslup is well fitted for the position. He was formerly assistant principal of the Blair Junior High School in Norfolk, and holds degrees given by the Virginia Polytechnic Institute and Columbia University. He has had wide experience as a teacher of vocational subjects and as a vocational counselor for the junior-high-school students of the Norfolk schools.

In his new work, Mr. Hyslup will assist junior- and senior-high-school teachers and principals in organizing programs for their schools, will offer teacher-training courses in vocational guidance, will assist in stimulating community interest in vocational guidance programs, and will cooperate with the school authorities in planning and organizing courses of study in industrial arts, general shop programs, and in outlining extracurricular activities in connection with guidance factors. He will also conduct individual and group conferences with teachers, parents, and pupils, will direct teacher-training courses in vocational guidance, hold demonstration case studies of pupils, and give addresses before civic, professional, and industrial organizations. The services of the vocational counselor will be given gratis to any school official of the state upon application to the office of the state supervisor of trade and industrial education.

Establish Printing Training Center

The local advisory board on independent education has approved a request of the printing industry of New York City for the establishment of a printing training center and for the incorporation of an appropriation of $2,500,000 in the 1930 budget. The training center which will be located between 34th and 42nd Streets, Sixth and Ninth Avenues, will have 200,000 sq. ft. of floor space. The initial step in the establishment of the printing school was taken at the request of Mr. S. A. Silcox, representing the employing printers' association, the New York Publishers' Association, and the allied printing-trades union.

Vocational Guidance Provided by Law

Provision for the creation of vocational guidance officers and bureaus in the public schools of New York state has been made in a new law passed by the 1929 legislature. The law authorizes school authorities in each district to "employ one or more qualified persons for the purpose of providing vocational and educational guidance for minors." The service, as well as the qualifications, of persons employed for the work are subject to the approval of the commissioner of education.

Part of the work of the bureaus will be to cooperate with the schools in establishing counseling services in order to advise pupils regarding their plans for education and the choice of a vocation. The bureau will also prove an aid to the schools in providing a placement service for minors who have completed their education and are ready to enter industry.

A final provision calls for the appointment of a supervisor of vocational and educational guidance, who is to cooperate with the school authorities in the development of a program along educational and vocational lines, and in studies and investigations dealing with these subjects. He must prepare

(Continued on Page 41a)

(Continued from Page 38a)

a yearly report on vocational training and educational opportunities in the state.

Continuation Schools to Be Improved

Plans for improving the facilities provided by the city for continuation schools for young people at work have been completed by the school officials of New York City. It is expected that the state will grant funds to assist in the work which it is estimated will cost $260,000. A survey of the buildings used for this work shows that of the 22 structures, not one has been built for a continuation school, and five were built before the Civil War. The Central Printing Trades School and the East New York Continuation Schools are housed in buildings constructed within the last decade and both are rented buildings. It is planned to remodel the old buildings to serve as adequately as possible the present needs by means of a thorough reconditioning of classrooms, shops, and offices.

Trade Training for Foundry Apprentices

Training of foundry apprentices in the Cleveland Trade School at Cleveland, Ohio, was begun with the opening of the fall term. The school is operated under the Cleveland Trade School cooperative plan and has recently occupied a new $46,000 addition. Student foundrymen will work with the most modern equipment, including a traveling crane, an automatic molding machine, a sand-mixing machine, a sand blast, and a core-making machine. Mr. J. G. Goldie, is instructor for the foundry classes.

Aviation Courses at Kansas City, Mo.

The board of education at Kansas City, Mo., has begun plans for courses in the building of airplanes and airplane motors. The courses will be of value in the trade schools and will be introduced under the direction of Supt. George Melcher.

New Evening Trade School in New York City

Plans have been completed for an evening trade school in Jamaica, New York City. It is planned to convert the present Jamaica Evening High School into a trade school, and the work has been reorganized along those lines.

Raise Pay for Continuation-School Teachers

Salary raises for continuation-school teachers of New York City have been planned under the new license which gives a salary equal to that of a high-school teacher. With the appointment of 150 teachers under the continuation-school license in September, the first step has been taken in the direction of giving a wage equal to that which a high-school teacher receives to all continuation-school teachers.

New Technical High School

Birmingham, Mich. Construction work has been begun on the Erskine Ramsay Technical High School, which will be completed on January 1, 1930, at a cost of $283,109. The building will contain a study room, a science room, and two teachers' rooms, in addition to 23 classrooms, and will provide accommodations for 875 pupils. Preliminary plans have been approved for the first unit of a building to contain eleven classrooms, a library, a study room, a general science room, an artroom, and shops for manual-arts work. A new twelve-room unit has been constructed for the North Birmingham Elementary School. An addition of two classrooms and a lunch-auditorium is being erected by the business department for the Gorgas School. The school will be of one-story construction and will be completed at a cost of $19,000. A new two-story addition of eight classrooms is being erected for the industrial high school for Negro students. Another addition of two stories has been authorized, to house 2,500 students and to cost $35,000. All of these buildings are part of a school-improvement program which has been begun during the present year.

Summer Vocational School at St. Louis, Mo.

A summer vocational school was conducted in the Hadley Vocational School, St. Louis, Mo., during the month of August. Work was offered in graphic arts, printing, mechanical drawing, drafting, woodworking, metal work, and electricity. Work in patternmaking and auto mechanics was carried on in the Roosevelt High School.

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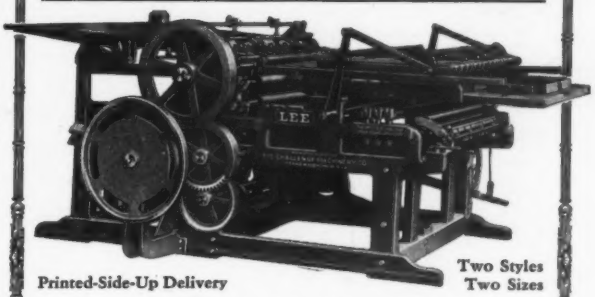

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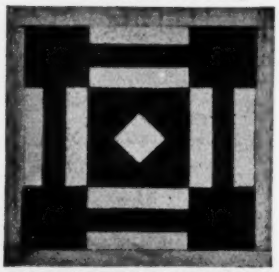

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